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CEYLON: ITS BOTANIC GARDENS; VEGETATION AND SHORT REPORT ON A JOURNEY TO CEYLON.*

As above mentioned, I was afforded the opportunity in the year under report of an official journey to Deli and Ceylon, in the company of the hortulan.

After a ten days' stay on the East coast [of Sumatra], we crossed over to Penang,......in order, after a short delay thêre, to embark on board one of the P. & O. steamers bound for Ceylon.

The visit to Ceylon had quite a different object from that to Deli. Agronomic questions were only of secondary importance: the main object being a proper acquaintanceship with the organization and working of the botanical establishments of Ceylon, consisting of the famed garden at Peradeniya—four miles from Kandy—and its four branch-establishments.

In the afternoon of 22nd June we steamed alongside the island in squally cloudy weather. About sunset the vivid lightning over the land reminded us of the old stories according to which the Arabian mariners sailing in those waters considered the incessant lightning as a sure sign that they were near Ceylon. At about half past one a. m. we were in the harbour of Colombo.

Scarcely had we landed the following morning when we were agreeably surprised to find that Mr. J. C. Willis, Director of the Botanical Establishments of Ceylon, had taken the trouble of undertaking a fairly long railway journey from Peradeniya to the low-country to welcome us at once on our arrival in Colombo.

During our whole stay in Ceylon Mr. Willis always had the kindness to spare no pains in arranging to make our journey as instructive, profitable and pleasant as possible. This is therefore also the place to warmly repeat our gratitude to him, the assurance of which, of course, we had before given him verbally. We desire further to tender our thanks to Mr. MacMillan, the Curator of Peradeniya Gardens, and Mr. Nock, Superintendent of the Hakgala Garden, for all they did for us.

Mr. Willis returned at noon to Peradeniya, where we were to follow him the next morning, having spent the night in Colombo, about which place, so far as they are appropriate in a report of this kind, will be found a few remarks at the end of this paper.

If there is no call to deal here in detail with the capital of Ceylon, it were right to begin by considering for a moment the climatic conditions of the island and the nature of its soil. This is necessary to a good understanding of what follows, as also to make a comparison between the conditions of primitive vegetation and husbandry in Ceylon, on the one hand, and Java on the other.

In the centre of the lowest and broadest portion of Ceylon one meets with a great network of mountains running pretty steeply to the South, and more to a level to the North, and quite flat in the Northern half of the island and the South-Eastern parts of it. The south-west monsoon which lasts during four or five months of the year, especially in May, June and July, brings with it much rain. On account of the configuration of the island these rains however affect only the south-western part of the island. When once the Monsoon winds have passed over the tops of the hills (7,000 feet, and higher) they are robbed of their moisture and changed into dry winds which cause, during the south-west Monsoon months, the northern and south-eastern parts of the island to suffer from terrible drought. Indeed in the mountain regions situated behind the high tops and ridges the drought is severely felt.

* Translated from *Verslag omtrent den Staat van's Lands Plantentuin te Buitenzorg over het Jaar 1898 by* Advocate F. H. de Vos and Donald Ferguson.

In October, November and December there is the north-east monsoon which causes rain all over the island, so that there are two rainy seasons a year in the south-western parts of the island. During these mouths of the north-east Monsoon the rainfall at a time is so heavy in the north-west and east of the island that there is relatively little profit to vegetation thereby, the country being completely under water for a few weeks and parched with drought for the remainder of the year, as Dr. Trimen, the late Director of Peradeniya Gardens, who died some two years ago, puts it.* Therefore one has, as Trimen says, to distinguish between a wet and dry Ceylon. The wet portion, which is specially regarded in cultivation, of any importance, is indeed the best known, but it only includes on an average a third part of the island, and the dry part—generally adopted for the cultivation of products of little value—the other two-third parts. By this alone it can at once be explained how it is that Ceylon, with an area of about one-half of that of Java, has only 3 million inhabitants against the 25 millions of Java. There can be also really no analogy between dry Ceylon and the central and eastern parts of Java where a pronounced period of drought is felt.

Not less great are the differences between the soil of the two islands. The entire country of Ceylon consists of ironstone, chiefly gneiss. The weathering product of this hard sort of rock has a peculiar copper or almost tile-red colour which caused the ancient Sinhalese to call this island "Copperland"†. Although here and there, rarely, hot springs are found in Ceylon, yet nowhere is the brittle volcanic stones found—a stone which generally provides in Java a soil with such favourable physical qualities. Finally it appears to me, that—although in a much less degree than both the other factors—the violence of the winds in Ceylon as compared with those of Java, must be regarded. That these winds must be often heavy there, is apparent, in view of the lay of the island from a glance at the chart. If one stands on the high cliffs from which Point de Galle derives its name (*Gala* in Sinhalese is hill or rock‡) between that high-standing place and the distant unknown regions which surround the South Pole no more land is to be found.

Although, especially on a brief visit, from the nature of the case, one does not at once perceive the influence of these violent winds on plantations, yet in this connection may be mentioned the large number of wind-breaks which they are obliged to plant in many places between the tea, for which purpose the *grevillea robusta* is generally used.

This influence, as it seems to me at least, is more apparent on the primitive vegetation of the hills. As I desire to avoid the reproach of being led by passing, and therefore false impressions made on me by this vegetation, let me again cite Trimen in his remarks on vegetation at the altitude of 5,000 ft. and above. With the exception of certain grassy tracts......all the hills are forest-clad over their summits—so he says. "The climate is generally very wet, and the forest has special characteristics. All the trees are evergreen, *for the most part rather small,* hard wooded and of very slow growth; they stand close together and form a very dark jungle"——The dense under-growth is very largely made of gregarious plants known by the Sinhalese under the name of *nilu.* These are a species of Strobilanthes.

* H Trimen, "On the Flora of Ceylon; especially as affected by climate." *Journal of Botany*, Vol 24, 1886.

† See the introduction to that splendid work of Messrs. Sarasin, *Eagebnisse naturwissen-schaftlicher Forshungen auf Ceylon*, Wiesbaden 1893.

‡ But the Sinhalese name is *Gālla*, not *Gala*, and has nothing to do with rocks.—*D.F.*

The hypothesis seems to me not too hazardous that the character of these Ceylon hill jungles, so different from similar high-lying virgin forests of most of our Javanese hills, must be attributed to, not only, the difference in the soil, but partly also to the frequent heavy winds that rage there. Setting aside this hypothesis, it is a fact, that, on the hills, *even of the most humid parts of Ceylon* no vegetation is to be met which can be compared with that on our Javanese hill-tops in moist districts at an elevation between 5,000 and 6,500 feet. This great difference in character strikes one forcibly, coming from here, especially on account of the dearth of the large number of huge high trunks found in our, as regards humidity, similar hill forests. As a whole it lacks further the peculiar *cachet* of equational luxuriousness so very characteristic of most of our hill-tops, at least of West Java. On the other hand, indeed, the same characteristic appears in the primitive forests of the low lands of the south-west wet Ceylon. This appears clearly from the description of Trimen at p. 328 (*loc. cit.*) of such jungle.

On 24th June early in the morning we set out on our journey to Peradeniya, which is 3½ hours' journey by rail. Going to the Fort station, situated in the centre of the city, we made two observations, which may be incidentally set down here. The first is that Colombo creates a much pleasanter, one might say a homelier, impression than Penang or Singapore, because in both these, as it were improvised cities, the original native population is supplanted by others, whilst in Colombo, as in our Dutch-Indian cities, they hold their own. The second is that the Chinese element is entirely absent, not, as it was told to us, because the Chinese are systematically kept out, but as traders they cannot cope with the specially cunning "Moormen," the descendants of the Arabs and natives. The absence of Chinese artizans is not however explained by this reason.

For the first three stations, Heneratgoda amongst them (of which hereafter), one continues in the flat country. Only after 40 miles by rail the country begins to be hilly. Small hills appear covered with vegetation from top to bottom. After this one arrives in a more and more beautiful and grand mountain district, and one climbs over a mountain pass of about 1,700 feet in elevation to descend again to Peradeniya about 180 feet. Although very fine and often indeed impressive the character of this landscape is quite different from that along one line of hills in the Preanger-Regencies. Instead of the relatively great and broad foreground surrounded from behind by high volcanoes with their peculiar shapes, not only are the shapes of the mountains and hills yonder different—fantastic and often cupola-shaped—but there is a lack of much foreground generally when once one gets into the mountain districts, since the levelling process is so much more gradual than with us. The smallest hills are so many hard masses of gneiss which require ages and ages to experience any deterioraton of consequence by the gradual weathering. It will strike anyone who knows the *Sawahs* of Java how much lower is the state of rice cultivation in Ceylon. The rice-fields seem to be badly cared for, in disorder and generally poor. The reason is chiefly because no nursery beds are used, but the grain is sown direct on the field. But in other respects there is by far not that trouble bestowed on rice-fields which our natives take over their *Sawahs.* The Ceylon Government has taken enough trouble for the improvement of rice culture, it has however not succeeded in overcoming the peculiar psychical bond that exists between husbandry and the conservative [proclivities in the sinhalese husbandman.

There is another matter, and that is to our eyes the relatively little significance attached to the bamboo Almost exclusively one sees the yellow variety o

Bambuse vulgaris, which is considered there to furnish only moderate building material. Indeed bamboo, as such, does not by any means play that important part in Ceylon which it does with us. This is one of the reasons why the native villages there, appear so dirty and unsightly. As regards cleanliness and neatness they cannot compare with our West Java villages.

Having got out at Peradeniya station at 11 o'clock, we were, a few minutes later, hospitably entertained by Mr. Willis in his house.

We owe a double debt of gratitude to Mr. Wills and his wife for their friendly hospitality, as Peradeniya is indeed a station but no town; there is only the little native village Iriagama on the other side of the river directly one crosses the satin-wood bridge. There are no lodgings to be had there for the public; and had it not been for the very much appreciated hospitality extended to us we should have been obliged to have often been on the run between Peradeniya and Kandy, a distance of about four miles.

The Botanical Garden at Peradeniya was established in 1821, thus only four years later than ours at Buitenzorg, and managed by A. Moon, who was an ardent student of Ceylon flora, and in 1824, published a catalogue of Ceylon plants. Unluckily Moon died in 1825 of fever.

For Twenty years the institution was left to take care of itself, and coffee, breadfruit and coconut were cultivated for the Government, "whilst botanical science was completely neglected." It is difficult to avoid the reflection in passing, in how many respects the history of the garden at Peradeniya is similar to that of our establishment at Buitenzorg: similar conditions resembling each other have had most prejudicial results at the beginning. In 1844 there was much improvement in the condition of Peradeniya by the appointment of Gardner, a capable botanist and energetic traveller, who went all over the island and, as a result of his travels, obtained a number of new plants for the garden. After Gardner's death in 1849 Dr. Thwaites was appointed Director. It was under the directorship of Thwaites, extending over a period of thirty years, that a series of improvements were introduced, and the institution acquired not only the necessary stability but a world-wide reputation. With his great merits, Thwaites had however also peculiarities in the catalogue of his time not quite inexplicable—of which I received assurances some years ago from very trustworthy sources. Himself thorougly knowing Ceylon plants, he thought that what was not serviceable to him was of no use to others, and labels on plants in the garden were considered quite unnecessary. Moreover he had conceived the idea, more inexplicable, that a botanical garden in the tropics ought to be a small edition of the primitive vegetation with all its capricious varieties of forms. As a result of this way of viewing the matter, he not only did not strive to follow the principle of arranging all plants resembling each other according to the natural system, but purposely rejected the same. During this period we entertained and carried out diametrically opposed ideas.

Although there perhaps lurks just a spark of exaggeration in this proposition, it is certain that Dr. H. Trimen, who succeeded Thwaites, as Director, found it necessary in 1880—when the undersigned came to Buitenzorg—to cause some modification in both these said views, and many improvements were also introduced by him. When this amiable savant honoured us with a visit to Buitenzong some years ago, he was suffering with deafness; but we had then no idea that this was only the premonitory symptom of a serious illness, which ended in total deafness and partial paralysis, and a couple of years later brought this excellent and highly-qualified man to the grave. If the garden at Peradeniya is under a debt of gratitude to him, he has moreover built a lasting monument to botanical science by the compilation of his *Flora of Ceylon*, of which the greater part was published during his life-time. The publication of the rest of the work was due to the zeal of Sir James Hooker. Our hospitable host, Mr. J. C. Willis, M.A., succeeded Dr. Trimen.

The choice of a site for founding the garden at Peradeniya was specially fortunate. On three sides it is bounded by the windings of the Mahaweliganga, the broadest river of Ceylon, which forms as it were an eye in which the garden is enclosed. The banks of this splended river, in comparison with which our Tjiliwong is a little mountain stream, are for the most part planted with a luxurious growth of bamboos and create a deep and regal impression, especially when seen from the satinwood Bridge (a, from a technical point of view, fairly long suspension bridge built entirely of wood) on the south-west side of the garden.

On entering the "Royal Botanic Gardens" of Peradeniya one passes round a beautiful grove of palms and reaches the commencement of a long straight road which runs to almost the back of the garden. The first part of this road is adorned on both sides with a large variety of bushes and low flower-plants, standing partly along-side and partly under various fine trees. The attentive upkeep of this approach at once creates an agreeable impression.

About half-way up the road it runs right through a very large lawn with a collection of palms in the centre surrounded by a circular path: "the great arch." The whole of this lawn and its surroundings are laid out in the well-known broad English park-style. Conceived in the same spirit, but still prettier are the surroundings of the "monumeot road" (loading to the "Gardner monument") with fine specimens of various trees (*Pometia eximia, Terminalia Belerie, Terminalia Catappa, Ficus Saccifera.*) Between this "Monument Road" and the aforesaid "great arch" but closer to the latter there are the places which serve as the office, museum, herbarium, library and laboratory. The herbarium is of course of much value especially for the original specimens of Ceylon plants which it contains: there is besides a very intertesting and beautifully executed collection of coloured drawings of plants made in the institution itself. For the rest, to one from Buitenzorg, as regards the appointments there is not much to be said. It would be a break of that courtesy which demands that a guest should be no critic, to say that the arrangements as regards the laboratory were wholly inadequate, so that at the instance of Mr. Willis it was intended to build a special and properly equipped laboratory which probably is now in use. It is not without a feeling of perhaps well-grounded satisfaction, that one sees the idea, carried out in Buitenzorg 15 years ago, to have laboratories attached to the garden, adopted now in another botanical garden in the tropics.

As the part of the garden where a systematic grouping of plants is adopted is still new and not extensive (behind the Director's residence), and as in the greatest portion of the garden such an arrangement is not adopted—as appears from what has been said already—the principles followed at the foundation call for no special remarks. This is not the place to give a list of plant-names taken from our notes or from the "Hand-guide to the Royal Botanic Gardens, Peradeniya." However we ought to mention some strikingly interesting or specially well-developed specimens, and especially, in the first place, a male specimen in flower of *Lodoicea Sechellarum*, some what older than ours, and flowering and fruit bearing species of *Couronpita Guyanensis*, the remarkable West-Indian cannon-ball-tree which quite recently blossomed in our garden for the first time. Among the really fine specimens found in Peradeniya must be mentioned *Pterocarpus indica*, *Amherstea nobilis*, *Schleichera trojuga*, *Artocarpus nobilis* and *Pericops Mooniane.* The same remarks applies to the remarkably large and robust collection of Burmese giant-bamboos, *Dendrocalamus giganteus* (the same kind of which a

large and small specimen are to he found at the entrance to our botanical gardens), which heing present in large numhers constitute one of the heauties of the garden at Peradeniya. Finally I cannot leave unmentioned a peculiarly pretty, although not long, lane of relatively still young specimens of *Corypha umbraculifera*, the justly famed *Taliput* palm.

Although the nurseries have hecn lately improved they are as yet not to be compared with what one sees at Penang and Singapore: From that part where the nurseries are, when one goes along the broad way which runs right through the garden parallel to the river, one comes on to a plot that is specially set apart for *culture plants*. To us with our extensive culture-garden at Tijkenment, this gives no occasion for a special visit inside. It should only be remarked, as regard *Cephaelis Ipecacuanha*,—as lately attention has been directed to the cultivation of this plant—that its cultivation in Ceylon has not been attended with much result as the *Ipecacuanha* plant, according to the statements of Mr. Willis, "seems to need some special conditions of soil or climate". That the land cannot he successfully cultivated in the open ground has heen repeatedly demonstrated first in Java and lately again in the Straits Settlements. It is only by garden culture in covered plots as evidenced hy practical experience that any results can he expected. It is evident that the portion of ground reserved for culture-plants now in Peradeniya cannot be compared with a large garden specially set apart for cultivation. There appears to he however in this respect a project of great and interesting changes now in contemplation. During the latter portion of our stay in Ceylon, rumours reached ns of a serious intention to transfer the seat of a languishing Agricultural College now in Colomho, to a large tract of ground close to Peradeniya, to serve as an experimental garden and place for instruction in agriculture. At the same time, so the rumour ran, the arrangements devoted to pure and experimental botany and its allied hranches should together form a special branch of the service—an "Agricultural Department" in the spirit of the homologous establishments working under expert direction and with a specially trained expert staff, such as work so usefully in the other British colonies, and especially in North America.

How far these remours will become definite plans, and what are the chances that these in their turn will reach fulfilment, the writer of this, speaking of his own knowledge, cannot say. Should the plans however he carried out, they would create a *rôle* of great importance at Peradeniya, of much use to agriculture in a colony where, just as in ours, though it may he in a somewhat less degree and certainly on a very much smaller scale, agriculture is the chief source of revenue.

The hotanic garden at Peradeniya issues annually a detailed report of its operations, hesides, at indefinite periods, according as occasion demands, small "Circulars." The little *brochures*, the publication of which was begun hy Mr. Willis (they are somewhat like our "Korte herichten uitgaande van den directeur van's Lands Plantentium" which are puhlished in *Teysmannia*), relate exclusively to practical experiments of value to the colony.

The annual reports also include the reports of the "Honorary Entomologist," Mr. Green, who in a general way by his meritorious publications on the injurious insects of Ceylon had already heen ahle to furnish very useful advice to agriculture there.

On 27 June we set out on a journey, with the ohject of going to visit, under the guidance of Mr. Willis, one of the four branch estahlishments of Peradeniya, namely Badulla. For that purpose we had to travel by rail until evening as far as Bandarawella, where the night was passed, in order to reach Badulla hy the mail coach the following morning. In this expedition we had the pleasure of being accompained hy Mr. J. Parkin, a young English botanist, who was engaged at Peradeniya in very interesting experiments with caoutchouc.

In spite of the fact, that all the lower and medium sized mountains that one passes are equally entirely denuded of jungle on behalf of cultivation, this railway journey is nevertheless from the point of view of natural heauty really astonishing. Again and again the eye is struck hy the frequently impressive beauty of the environment. To attempt, from a tourist's standpoint, to give some idea of the landscape, would he a very difficult task, and one that in any case would be out of place here. The two principal impressions of those made upon us during this journey belong however to categories *certainly* coming within the scope of this report. The one is of an agronomic, the other of a hotanics nature.

Everyone acqnainted with Ceylon knows that hy the influence on agronomic grounds can only he meant the extent and importance of the tea cultnre.

The tea district begins near Peradeniya. Immediately opposite to the garden, at a distance of a couple of paces, are the gardens of the "New Peradeniya" estate, which yields about one per cent of the whole tea product of Ceylon.

Shortly after leaving the station of Peradeniya Junction, as far as and even above the station of Nanuoya situated at 5,300 feet, one rides literally continuously through tea plantations. I do not helieve that one will anywhere else—unless indeed in the wine-growing districts—meet with a cultnre, carried on upon so large a scale, predominating so greatly in a whole stretch of country.

When one considers, that, as I found stated, in 1875 only 282 pounds of tea were exported from the whote of Ceylon, and the export in 1898 amounted to nearly 120 million pounds, then one must have great respect for the energy of the Ceylon planters. The more so when one also knows that jnst in those districts great losses were suffered through the coffee-leaf disease. On many places where tea now stands coffee was earlier found, and partly also cinchona; in addition many waste lands were also cleared and planted with tea. It was originally attempted to ohtain these lands at as high an elevation as possible, it being known that a high situation above the sea has a favourahle influence upon the quality of the product. Estates are even met with going up to 7,000 feet; among others a well-known estate above Nuwara Eliya famed for its good product. During the past few years the Government have, in order to prevent further devastation of the forest jungle, given no more permission to denude lands situated higher than 5,000 feet of jungle and hring them under cultivation.

When one sees tea planted everywhere and everywhere, from the immediate neighhourhood of the railway to as far as the eye can reach, on mountain and in valley, npon the steepest slopes and the most unlikely-looking places, there involuntarily arises, with all respect for the strength of spirit developed hy the Ceylon planters, the question, whether the praiseworthy energy has always gone accompained hy a corresponding caution; and whether, with falling prices, hy means of increasing competition and other operative factors, the plantations formed on less favonrahle lands will, in comparison with the favourahly sitnated estates, not have a very hard strnggle. In very many places the soil of the tea gardens possesses extremely little humus, belonging in general to what one calls a poor soil. According to what Mr. Willis told me, this is met by some hy means of manuring with able manure and guano.

Whilst those persons living in Java who have a direct concern in tea cultivation are naturally in the highest degree interested in Ceylon tea statistics, it is at the same time perhaps not unimportant to refer to

the really enormous increase that the export of tea from Ceylon to Russia has undergone in *one* year. In 1897 that export amounted to 439,349 pounds and in 1898 2,714,005 pounds: thus nearly seven-fold. This in truth agrees with what I learned four years ago more than once in Russia, and what has since been repeatedly asserted to me by Russian visitors here, namely, that the non-Chinese teas will find a great sale in Russia.

Before concluding these short incidental remarks regarding the tea culture, there is yet another question that deserves to be touched upon, even though it be with a single word. It is that of labor. The person engaged in agriculture in Ceylon does not find as do his colleagues in Java (excepting the employment of Madurese labor in East Java) the needful laborers amongst the population of the island itself. As a rule there is no Sinhalese labor, but Tamil coolies obtained from British India, from the Madras Residency.* According to what I was told, these coolies are mostly easily to be obtained, at wages of 30 to 37 (as maximum) rupee-cents per diem. If the fact that the indigenous population counts for nothing or at any rate for very little as a labor force, does not seem to cause the European agriculturists very much trouble and loss, it must certainly be without the condition of injury to the country itself. The Tamil coolies however—not to be confounded with the Tamil families living in Ceylon (comprising some 440,000 souls) in the north in and near Jaffna, and in the east in the region of Batticaloa—do not remain in Ceylon, but generally return after a pretty short time to their houses in British-India. The earned and saved sums of money, reaching, as I was assured to pretty considerable amounts, are carried home with them, or are often sent from time to time by post. All this money leaves the country and thus does not contribute to the increase of the welfare of the population in the districts where the European agriculturists carry on their occupation. This evil, there unavoidable, is not to be reckoned too lightly; let one only think—to make a comparison with an equal tea-growing region of Java—of the evident welfare in our villages in the Preanger Regencies where the people work on and for the tea estates.

Between the Nanuoya station and the small stopping place situated at the highest point of the railway (6,300 feet) the land under cultivation becomes steadily more infrequent and the natural vegetation in direct ratio comes more and more, and at last entirely, into the foreground. And it is in that sphere that the great botanic—or more strictly speaking vegetogeographical—peculiarity falls to be noticed to which reference was made above.

The mountain slopes are only partially covered with jungle. Among the woods, forming large complexes and strips, and bordering immediately upon them, one sees grass-covered lands, which either form great bays in the jungles, or in the fashion of broad passages separate extensive forest-complexes from each other to assume elsewhere the character of enormous accidented grass-fields. These lands, whose prominent characteristic is, whatever in addition their form may be, that they are so remarkably sharply divided from the neighbouring pieces covered with jungle, bear the name of "patana." Looking at a distance like rather short-kept lawns, these patanas are in reality formed of pretty high and coarse grasses (species: *Andropogon*, *Arthistiria*, *Pollinia*, *Garnotia*, *Arundinella*), amongst which occurs a peculiar flora, consisting of pretty numerous ground-orchids, immortelles (*Anaphalis* and *Helichrysum*), gentians, wahlenbergias, &c; besides some low-growing bushes of the families of the Leguminosae, Rubiaceae and melastomaceae. As a further peculiarity of these patanas it is to be noted, that, at least in the high-lying ones, literally only *one* variety of tree occurs, namely *Rhododendron arboreum*. Very scattered in the large grass-plains, standing alone, these rather low trees with short, mostly crooked, branches have as such no handsome appearance; covered, however, with masses of large blood-red rhododendron flowers they form so many brilliant bouquets standing out gloriously from the monotonous brown-green under-layer of grass.

The whole landscape in the high patana region is *so* singular and the demarcation between grass and jungle so abrupt and always *so* sharp, that one can hardly believe that one sees before one the work of nature alone, and one is constantly inclined to ask who can have been the genial designer, who had the audacity to cover the mountain slopes and tops with a park on a gigantic scale, wherein woods and enormous *pelouses* [lawns] leaving open bold perspectives, alternate with one another.

Rightly says Trimen, in his article already quoted from on the flora of Ceylon: "A curious phenomenon, which strikes every traveller in the mountains, is the very abrupt line of demarcation between the patana and the forest; so sharply defined is this that it is hard to persuade oneself that nature alone has had a hand in it. The explanation appears to be that in the course of vast ages a perfect equilibrium between the two floras has been arrived at, so that now neither can encroach on the other: the patana plants are unable to exist in the dense shady forest, whilst the seeds of the forest trees never get a chance even of germination in the closely occupied grass-land, so far as can be observed, this balance is now maintained without change."

That the equilibrium is formed and at the same time, so far as one can judge, maintains itself unaltered is a fact that is indisputable. Nevertheless it is quite enigmatic *how* it has arisen and also to a certain extent how it endures. Especially is this an enigma, for the time being totally insoluble as it appears to me, since the patanas certainly are found rather on the dry side of the mountain range, but by no means exclusively. On the wet side of the mountains they also occupy large stretches; it was just there that we saw them for the first time, going up from Nanuoya. In this relative independence of the climatological conditions the patanas differ from the llanos of Venezuela and the savannas of Guiana, to which they otherwise have a resemblance.

It was certainly wet enough at 6,000 feet elevation. Clouds, mist and rain all together, caused cold shivers, to run through one's limbs.

But, in the strict sense, as by the stroke of a magician's wand, all was changed.

A few moments after one has passed the highest point, one comes through a long tunnel, followed by several smaller ones, and suddenly one is in dry Ceylon. By the landscape, by the uniform tints, by the feeling, in short by everything one recognizes, that one has been at once transported into a district as dry as a cork. And that, when only half-an-hour previously one's teeth were chattering. This extremely remarkable contrast also forms not one of the least of the surprises in which this journey so rich.

The brief details given above, having reference to the chief causes that distinguish the climate of Ceylon, makes the rapid transition intelligible; only a personal view, however, can convey a just conception of the striking effect of this unprecedented change of climate between the two sides of one and the same mountain range.

Before the falling of the evening we reached the terminal station Bandarawela, under the impression of the selfsame panorama formed by hundreds of hills and mountain tops, all shining in those uniform red tints peculiar to arid and dry regions of

* *Sic.—D.F.*

warm countries. And notwithstanding one finds ourself in the midst of a tropical island lying seven degrees from the equator.

At Bandarawela we spent the night at a small but well-arranged hotel. It is thought of making of the place a kind of sanatorium later on, just on account of the drynesss of the climate. If the place is to become really habitable then the great difficulty of the production of shade will first have to be overcome. As it is now——we experienced it the following morning during a little botanizing expedition on the patana—although one is at a height of about 4,400 feet, after eight o'clock in the morning it is so scorching hot, that one hastens to flee indoors, where the cold, in contrast with the terrible heat outside, does not feel pleasant, as being too great a contrast.

By a difficult but excellently-made mountain road a mail coach brought us, over a distance of 18 miles, from Bandarawela to Badulla, the identical first object of our expedition.

The garden at Badulla, or rather the gardenette, since the surface comprises not more than 11 acres, was founded in 1886 by the former Director, Trimen, with the object of there trying tho cultivation of various useful plants, in order to find out which of those plants were adopted for the particular climatological condition of the province of Uva, of which Badulla is the capital.

(*To be concluded.*)

SUGAR ITEMS.

During the past seven years Queensland has sold sugar to the value of £6,500,000. Last year £1,163,010 was paid into the colony for this single article of produce. The loss to the working classes by the destruction of this industry would amount to the wages at the fifty-eight mills and ten juice-extracts plants alone, of nearly 4,000 white men. There are in addition some 3,000 farmers, who grow cane for the mills. Probably 8,000 Europeans are employed outside the factories pretty well all the year round, besides some 10,000 indirectly engaged in the industry. Thus they are actually some 25,000 white men employed to 9,000 kanakas, the labour of one of the latter enabling employers to employ nearly three whites. The 9,000 kanakas are employed in the field, but it is with great difficulty that the number can be kept up to the figure.

In 1899 Queensland exported 109,045 tons of sugar to Europe, the Australasian colonies, China, and Japan, &c. Does it ever strike any of those who cry aloud again black labour to try and calculate how many white men earn bread for their wives and families by means of this annual output of sugar? Do they ever consider the operatives in British factories who make the linen for the bags, the twine and the needles, the men who navigate the ships which carry it, the engineers who make the machinery—worth in Queensland probably some three millions? Again do they consider the numbers of horses and teamsters employed in the industry both on plantations and in the cities? Wharf labourers have to haudle very once of sugar. How many comfortable homes are the direct result of the sugar industry? For every coloured labourer sweating in the canefields there are a dozen white men and women earning good wages, which they would not be able to earn where it not that there employers enaled to pay them those wages through the means of these reliable, yet not too cheap, coloured workers. Every ton of sugar produced in the colony is worth from £4 10s. to £6 to the cane-producers, mostly hard-working men who, by sugar-growing alone, provide comfortable homes for their wives and families, and indirectly for thousands of wharf labourers, teamsters, and draymen's families.

Such an industry is well worth fostering, not by bonuses, but by assistance to introduce superior methods of cultivation by which heavier crops and a higher sugar content may be obtained. During the present season a Fine engaged in sugar-growing took 70 tons of cane off 1 acre of his land, where others were only getting from 17 to 20 tons. It may be presumed that the land was rich, new, scrub land; but is it not within the power of science to put even worn-out land into the same condition by means at once cheap and effective? This is what it is hoped that Dr. Maxwell will bring to pass. He will be here by the time this *Journal* goes to press, and he arrives at the right time to at once put existing and intending planters on the right atrack. Should his work have the result of increasing the sugar output by 9 tons of cane or 1 ton of sugar, the black labour question would cease from troubling. It would gradually die out, especially if it should come to pass that the work of "trasbing" is found to be superfluous, and an effective cane-cutting machine be invented. We have seen in the introduction of a very useful cane-planting machine, and there is little doubt that ere long some inventive genius will discover a means of mechanically cutting and tropping cane plants in whatever condition the crop may be, whether uneven in height blown over by the wind. When that comes to pass the need for the kanaka will pass away, and the Northern canefields will no longer be the terror of the white man.—*Queensland Agricultural Jounral.*

HOW MUCH SEED TO USE

Last month we gave the quantities of seed o various crops required per acre broadcast or in drills. To this list we may add the quantities required per acre in hills:—

Maize, 8 to 10 quarts; cucumbers, 2 to 3 lb, climbing beans, 8 to 10 quarts: rock-melons, 2 to 3 lb.; squash 2 to 3 lb. pumpkins, 2 to 3 lb.; water-melons, 4 to 5 lb.

The quantity of seed required to furnish a certain number of plants, approximately, and allowing for seeds which do not germinate, is—Asparagus, 1 oz. to 500 plants; cabbage, 1 oz. to 1,500 plants; cauliflower, 1 oz. to 1,000 plants; celery, 1 oz. to 2,000 plants; egg-plant, 1 oz. to 1,000 plants; endive, 1 oz. to 3,000 plants; leek, 1 oz. to 1,500 plants; lettuce, 1 oz. to 3,000 plants: pepper, 1 oz. to 1,000 plants; tomato, 1 oz. to 1,500 plants.

Quantity of seed required for a given number of hills—Maize, 1 quarc to 200 hills; cucumber, 1 oz. to 125 hills; musk-melon, 1 oz. to 60 hills; climbing beans, Lima, beans, 1 quart to 100 hills; climbing beans, wax, 1 quart to 150 hills; pumpkin, 1 oz to 50 hills; squash. 1 oz. to 50 hills; water-melons, 1 oz. to 30 hills.

Quantity of seed required for a given length of drill —Asparagus, 1 oz. to 60 feet of drill: beets. 1 oz. to 50 feet of drill; beans, dwarf, 1 quart to 100 feet of drill; carrot, 1 oz. to 100 feet of drill; endive, 1 oz, to 100 feet of drill; okra, 2 oz. to 40 feet of drill; onion, 1 oz. to 100 feet of drill; onion sets, 1 quart to 50 feet of drill; parsley, 1 oz. to 125 feet of drill: parsnips, 1 oz. to 200 feet of drill; peas, 1 quart to 75 feet of drill; radish, 1 oz. to 100 feet of drill; salisify 1 oz. to 70 feet of drill, spinach, 1 oz. to 100 feet of drill; turnips, 1 oz. to 150 feet of drill.—*Queensland Agricultural Journal.*

Polishing Rice.—There is a great deal in the style in which any product of the soil or manufactured article of food is got up for market. Coffee, rice, arrowroot, honey, ginger, preserves, and many other articles produced and manufactured in Queensland, have often suffered in competitive markets in consequence of being either carelessly prepared or badly packed, or put up in unsightly vessels and packets. The *Grocer*, an authority on such matters, says that fashion demands a bright lustre in rice, and this is secured by rubbing off a dull outer coating of the grain, which has been shown to have a food

value nearly twice as great as the rice grain after polishing. The polishing process, however, greatly improves the appearance of the grain, and it is now almost universally practised in cases where the rice is intended for occidental markets. The material scoured off is preserved and sold under the name of rice flour. The polishing is effected by friction against the rice of pieces of moose hide or sheepskin, tanned and worked to a wonderful degree of softness, loosely tacked around a double revolving cylinder of wood and wire gauze. From the polishers the rice goes to the separating screens, composed of different sizes of gauze, where it is divided into its appropriate grades. The rice is then packed in barrels or sacks and is ready for the market.—*Ibid.*

DESTRUCTION OF MOTHS.—At Aigle (Switzerland) little boys armed with glued rackets go at dusk into the vineyards and catch the night moths, the eggs of which would produce the devouring worms which cause there such havoc amongst the grape-vine leaves (*Chochylis*). This new way of hunting was quite successful. In a few days, and on a few acres only over 20,000 moths were caught, representing millions of eggs and worms. [We believe that the experiment of catching fruit-flies by means of butterfly-nets was tried with good results by Mr. C. S. Voller. How would the sticky racket answer, fixed to handle?—Ed. *Q.A.J.*

THE EFFECT OF SCIENTIFIC INVESTIGATION UPON AGRICULTURE.

The *art* of agriculture is as old as man, but the *science* of agriculture has not yet completed its first century. It seems at first thought impossible to believe that, before the nineteeth century dawned, agricultural science was, to even the most advanced scientific workers and explorer, a—"dark continent." In 1804, De Saussure published a work entitled, "Recherches sur la Vegetation," in which he gave the analysis of the ashes of many plants, and contended that they were absolutely essential to the growth of the plant, that they must be derived from the soil, and that probably these ash or mineral constituents that the plant derived from the soil were the source of those found in the animals which fed upon the plants. From 1802 to 1812 Sir Humphrey Davy delivered several series of lectures, which he published in 1813, under the title "Elements of agricultural Chemistry." To him is due the credit of making the first attempt to reduce agricultural knowledge and investigation to a scientific basis. The work of these two men, together with that of Thaer, Sprengel, and Boussingault, prepared the way for the magnificent work of Liebig, whose publications appeared in 1840 and 1842, since which time many of the brightest minds in Europe and America have been investigating the composition of the soil, plant, and animal, and their relation to one another.

Davy said. "Discoveries made in the cultivation of the earth are not merely for the time and country in which they are developed, but they may be considered as extending to future ages, and as ultimately tending to benefit the whole race, as affording subsistence for generations to come; as multiplying life; and not only multiplying life, but likewise providing for its enjoyment."

Liebig, in one of his productions, wrote: "I shall be happy if I succeed in attracting the attention of men of science to a subject which so well merits to engage their talents and energies. Perfect agriculture is the true foundation of trade and industry—it is the foundation of the riches of states."

Chemistry was the first science that came to the assistance of agriculture, and ever since agricultural science has been largely built uodn agricultural chemistry as a foundation.

Its application in connection with soils and fertilisers, foods and feeding, and with dairyings is readily comprehended. A large portion of the work in other sciences could not be carried on without the assistance of the agricultural chemist. Perhaps one illustration of the value of chemistry may be sufficient for our present purpose. The beet sugar product in Germany has increased from 360,000 tons in 1876 to 1,620,000 tons in 1896. The average product of beetroot is about 10 tons to the acre. In 1876 the 10 tons produced less than 2,000 lb. of sugar, whereas in 1896 the same weight produced 3,000 lb; in other words, the beet-root of to-day contains over 50 per cent. more sugar than it did twenty years ago. To the agricultural chemist belongs the large proportion of the credit for this marked improvement.

Botanists are at work studying the plants of the world, and helping in the production of new varieties and the improvement of old varieties. Let me give you but one example of the value of this. About 6,500,000 acres in Ontario are devoted to grain-growing. If by selection and cross fertilising we ceuld obtain seed grain that would add only one bushel per acre to the crops, the annual grain product would be increased by 6,5000,000 bushels. The grain crops, of Ontario in 1897 were worth over $50,000,000. An improvement to the extent of 25 per cent. is quite within the range of possibility. The President of the Agricultural College, in his report for 1897, referring to this work in improving varieties of grain, says:—"In this way some excellent foreign varieties have been introduced, tested, and distributed throughout the province—varieties which yield from 6 to 8 bushels per acre more than any varieties previously grown. In oats and barley alone, the varieties introduced and distributed by the experiment stations have, within the past four or five years, paid to the province a good deal more than the entire cost of the College for the last ten years."

Entomologists are studying the thousand-and-one insects and diseases affecting our grains and fruits. One practical example will perhaps best illustrate the value of Entomology. About ten years ago the complete destruction of the orange groves of California was threatened by the spread of an insect known as the "cottony-cushion scale." The vitality was being sucked out of the trees by millions of tiny insects that literally covered them. The pests got completely beyond the control of the fruitgrowers of that country, and in their despair they appealed for help to somebody or anybody. Professor Riley, who was in charge of the Entomological Department at Washington and who unfortunately met his death in 1895—one of the greatest benefactors the American people has ever known—at once began the investigation of that question. Being an expert entomologist, he knew practically every country in the world where that scale insect was common, and he knew that the place from which it had most likely come was Australia. It had probably been introduced, some twenty years before that, in bringing fruit trees or vines. He, however, knew it had never become a pest in Australia. Now if it is found in Australia and later found in California and had not become a

pest in Australia, he concluded there must be something in Australia that will stop it, so he despatched two assistants to Australia to investigate it, and they sent back consignments of lady-bug beetles or lady-bugs as they are commonly known. You have seen these running back and forth over the leaves and branches of the fruit trees, doing great destruction to the other insects. Within a very short time, less than a year, although these scale insects had been increasing for twenty years and practically had the product of California by the throat, and, in fact, had taken possession of the country; in less than a year, this little lady-bug had increased to such numbers that it swept the scales out of existence, or got it into such control, that the fruit interests of California were saved. I do not suppose that anybody could sit down and readily figure up the amount of money that was saved or made for the United States, by that simple little insect brought in by a man known to very few present. You do not see his name prominent in the newspapers. The fact was not heralded broadcast in great flaming type. He was not given any great ovation. It is a question whether any monument will be erected to him by the United States, yet it is doubtful whether the United States has had any greater benefactor than that man and his associates. The importance of economic entomology to the farmer is thus referred to by the late Professor Panton, of our Agricultural College, in an article contributed to the Farmer's Institute report for 1896-7 ;—

"The study of insects in relation to man has of late years commanded much attention, and is usually referred to as economic entomology. While there are some insects beneficial to man there are many injurious. Some destroy his food, some injure his clothing, and others attack the animals that are of use to him. Nearly 100 species have been found preying upon his grain and forage crops; upwards of 40 upon his vegetables; 50 upon the grape; 75 upon the apple. The pine has 125 species as enemies; the oak, 300; the elm, 80; the hickory 170; the maple, 75; the beech, 150; while the unfortunate willow battles against 400 insect foes. The following statistics show what an immense loss is sustained by man from insects :—

1854—The United States lost $15,000,000 by wheat midge.

1857—Canada lost $8,000,000 by the wheat midge.

1864—The United States lost $75,000,000 by the chinch-bug.

1870—New York State lost $5,000,000 by the cabbage worm.

1873—The Southern States lost $25,000,000 by the cotton worm.

1874—United States lost $356,000,000 by the grasshopper.

1884—Canada lost $5,000000 by the clover midge.

The average loss of the United States from insects during 1884 is calculated to have been $400,000,000, and for 1891 $300,000,000. With such figures before us, in most cases under the mark, we must conclude that the study of a subject that will enable us to lessen this loss is of great importance."

The biologist is studying the microscopic forms of life that produce plant food in the soil, that bring about the changes in stored foods, that control the fermentation in milk, butter, and cheese, and that cause the many diseases in our live stock. The debt that the whole world owes to the great Pasteur should not be forgotten. He established the principles of winemaking, and saved the vineyards of France ; he laid the foundations for dairy bacteriology ; he mastered anthrax, the terrible disease that threatened the annihilation of the herds, not of France alone, but of all Europe as well. He was one of the greatest geniuses that the world has ever known, and agricultural science received a wonderful impetus from the labour of his head and hands and heart.

So important is scientific research in connection with agriculture that one noble-minded Englishman set apart a great estate in England for that work, and endowed it with £100,000. For about half-a-century the work has been carried on at Rothamsted, and the Queen has recognised it by knighting its donor and assistants. Sir John Bennett Laws and Sir Joseph Gilbert are familiar names in the higher agriculture of the whole world.

One of the hopeful signs of the times is that agricultural scientific investigation is attracting more and more attention on the part of our Governments, young men of promise are being drawn into its ranks, splendid opportunities for research are being provided in many countries, and we may confidently look forward to a great advancement in the next quarter of a century. The probable effect upon agricultural life of the application of scientific investigations and discoveries may well attract your careful attention —*From Appendix, Ontario Bureau of Industries.*

SIR JOSEPH HOOKER has been elected one of the Foreign Associates of the French Academy of Sciences, Institute of France.—*Gardeners' Chronicle.*

LINNEAN SOCIETY.—The last meeting of the Society was held on Thursday, December 20, at 8 P.M., when the following papers were read :—Mr. ARNOLD T. WATSON, F.L S., "On the Structure and Habits of the Ammocharidæ;" Mr. I. H. BURKILL, M.A., F,L.S., "The Flora of Vavau, one of the Tonga Islands;" Prof. POULTON M.A., F.R.S., "On warning Colours in Insects." Exhibitions—Dr. J. W. CORNWALL, F.L.S., two photographs of composite flower which appeared on a white Foxglove growing in a garden near Godalming; Mr. B. DAYDON JACKSON, Sec. L.S. two editions of Hills *Flora Britannica* with a note on the species of Statice included in them.—*Ibid.*

THEY NEVER DRINK.—An exchange says:—There are hundreds of horses and thousands of cattle in the Hawaiian Islands which never take a drink of water throughout the whole course of their lives. On all the islands the upper altitudes of the mountains are given up to cattle ranges. The cattle run wild from the time they are born until they are sent to the slaughter-house. Except possibly two or three months in the rainy-season, there are no streams or pools of water in any parts where the cattle range, but everywhere there grows a recumbent, jointed grass known by he name of maninia. This is both food and drink. Horses and cattle grazing on it neither require water, nor drink it when offered.—*Journal of Western Australia.*

CANNA OR INDIAN SHOT.*

General Characters.—Canna is a genus of the natural order Scitamineæ, to which belong the Plantain or Banana, the Cardamoms, Arrowroot, &c. It contains upwards of sixty species and innumerable varieties. The great majority of the former are natives of South America, only one species, *Canna indica* ("Butsarana" of the Sinhalese), being indigenous in Ceylon. Ordinarily they are characterized by a tuberous perennial root-stock; herbaceous leafy stems, 3 to 6 feet high; large oblong Plantain-like sheathing leaves, green or bronze, with a strong mid-rib and prominent parallel veins; the inflorescence being a spike or raceme produced at the apex of the stem. The flower includes three small greenish sepals which remain attached to the fruit or ovary after the rest of the flower falls away; three narrow petals which are somewhat showier than the former, and within these again a number (one, three, four, or even more†) of other petal-like brightly-coloured leaves, which constitute the most showy part of the flower. One of these bears an anther and is the stamen of the flower; the others have no anther, and as they are usually supposed to have been derived from stamens which, as in double roses, have lost their anthers and become petals, they are often called staminodes. The only fertile (anther-bearing) stamen is situated in the middle of the flower, next to the petal-like stigma, the anther being attached down its edge. From this petaloid character of the stamens the flower may be considered to be naturally "double." The fruit, persisting on the flower-stalk, is round and oblong, with a warty surface; in the young or ovary state it contains many ovules (potential seeds), but even when growing wild only one or two of these become developed into fertile seeds. The latter when ripe are round, black, of the size of a pea, and very hard: hence the name "Indian Shot." The disposition to produce seed is still less in cultivated varieties, and, in the case of the "Orchid-flowering" class and some others, seed is seldom or never yielded. Thus the increase gained by the hybridist in size and brilliancy of flower may be said to be at the expense of the reproductive functions.

Barrenness in the fruit may however arise from other causes. Seeds never seem to be produced here by *Canna edulis* ("Butsarana"), this being no doubt due to long cultivation and to the practice of propagating the plant exclusively by means of its underground tubers.

As regards modes of propagation, infertility in Cannas may not be considered a disadvantage, except from the hybridist's point of view, as the quickest and best means of increase is by division of the crowns ("stools"), the seeds being so hard that, even if steeped for some time in boiling water previous to sowing, they usually take several months to germinate; consequently filing the outer coat of the seeds is occasionally resorted to, whilst burying them for six months in a manure pit is also recommended.

The beauty of these plants is not their only feature of interest, for some are also of economic importance on account of their underground tubers which yield an article of food, being ground and made into a flour. The well-known arrowroot "Tous-les-mois" is furnished by *C. edulis*, a native of the West Indies, but introduced and cultivated in most tropical countries. Of less utilitarian value, however, is *C. indica*, the real "Butsarana" of the Sinhalese, who gave it this name, which means "help from God," on account of the seeds being used in rosaries by Buddhist worshippers.

History.—The introduction of the first Canna (*C. indica*) into Europe dates back to about 1570. With the exception of this no other species seems to have attracted notice until about the beginning of the 19th century, when several species were introduced for the first time into European gardens. At that time these were grown chiefly for the beauty of their foliage, and on this account became, and are now, much in favour in temperate countries for planting out in groups in the open during the summer months for sub-tropical effect. Therefore the larger and more robust the plants the more effective were they for this as well as general decorative purposes where foliage only is concerned, and clumps growing 10 to 12 feet high were no uncommon occurrence. Consequently any improvement attempted by the cultivator was directed towards the increase in size of stems and foliage. Since 1863 a great gain in size and brilliancy of flower has been gradually gained by the hybridist, which has resulted in the modern varieties of Cannas—a most showy class of "flowering plants," very different in the form and appearance of floral characters from those of their progenitors. Few productions of recent times have created more general interest than the advent of these, or have proved a more valuable acquisition to floriculture. Robust growth of foliage may now be regarded rather as a disadvantage than otherwise, as plants of a dwarfish habit are the most satisfactory for general purposes. In the Tropics, where Cannas have their natural home, probably the most popular class at present are the "Orchid-flowered" forms, a designation which has been applied on account of the general resemblance of the flowers to those of a Cattleya. They are readily distinguished by their large and usually widely expanded and flat-surfaced flowers, which have invariably a rich velvety tint. These date their origin from 1893, being the result of crosses obtained by Messrs. Dammann & Co., of Naples, between *Canna flaccida* (a red flowered species of the Southern United States) and garden varieties. Many of the older so-called "Gladiolus-flowered" type are not however to be despised, and in some respects are even preferable to their more recent congeners, especially for use as cut-flowers or for growing in pots or boxes.

Cultivation.—Few plants are more easily grown than Cannas, or more satisfactorily repay cultivation for ornamental purposes. Their evergreen foliage and perpetual habit of flowering render them exceptionally useful, particularly in tropical gardens, where the variety of suitable-sized and showy flowering plants is comparatively limited. Though in Europe Cannas have an enforced period of rest in the winter months, during which time their tubers are stored away and kept dry, here they can be grown all the year round, especially at elevations below 4,000 feet. They are naturally suited to a hot moist climate, and it is under these conditions that their ornamental character is best developed. Their cultivation is very simple, the chief requirements being rich open soil and a liberal supply of farmyard manure. In this they do well, and require but little attention beyond watering in dry weather and occasional mulching and forking up of the surface of the soil. Before planting, the ground should be deeply dug or trenched and heavily manured near the surface, Cannas being essentially surface-feeding plants young off-shoots or small divisions of the crowns ("stools") may then be planted out 2 to 3 feet apart. Any portion of the crown will grow and rapidly form new plants, provided it is furnished with a bud or a short tuberous root-like structure; this is really an underground stem, bearing rudimentary scale-like leaves, and will in due course develop into an ordinary stem with foliage, &c. In about six weeks after planting, the plants will begin to yield a display of flowers, which will be continued for several months. They quickly form clumps and gradually spread over the ground, becoming in time overcrowded; they exhaust themselves, so to speak

* Circular Royal Botanic Gardens, Ceylon December, 1900.

† Usually fine in cultivated varieties.—Curator.

the flowering stalks becoming tall and bare by their continuous habit of flowering, and the flowers smaller and scanty. It is therefore advisable to lift the plants at least once a year, replanting them as already advised, the process of digging and manuring being repeated each time. When grown in pots or boxes the plants should be allowed as much light and air as possible, as otherwise they will become too tall and lanky. Those most suitable for such culture are probably the "Gladiolus-flowered" varieties, which are included under Class II.

Cannas will thrive at practically all elevations in Ceylon, though they are best adapted for the low-country, where, up to 3,000 feet altitude, their flowers will be larger as well as more plentiful and effective.

As regards arrangement in planting out this is entirely dependent on local conditions and individual taste. Cannas are, however, especially adapted for planting in groups or masses, or at the back of borders; whilst they are also effective when planted amongst a mixed border or against a blackground of shrubbery; but in pots, tins, or boxes they are seldom satisfactory except as "foliage plants" when in healthy growth. The bronze or purple-leaved kinds, apart from their flowers, may be made to afford a pleasant contrast with green or variegated foliage, and are worth growing on this account alone. It may be stated that an open, sunny situation, away from the shade of trees, is the most conducive to a floriferous habit.

CLASSIFICATION.—For botanical purposes Cannas are divided into four sub-genera, based on scientific distinctions in which the average grower is not much interested; nor are these really of importance from a horticultural stand-point. In any case, with the garden varieties it is practically impossible to follow specific distinctions and, it being difficult to place these plants in any order of merit, an arrangement in accordance with the purpose they fulfil in the garden will be of the most practical guidance to persons making a selection. Thus considered, height of stems with foliage is probably of the first importance, next to this being respectively colour of leaves and flowers. The "Orchid-flowered" class are easily distinguished, as already stated. They have large and usually flat-surfaced flowers, borne on spikes which become very elongated, and are generally coloured with rich velvety tints. In the purple-leaved section of these the flowers are generally smaller and more or less funnel-shaped.

The "Gladiolus-flowered" varieties however do not seem to be so well defined. These are generally of a more compact habit of growth than the former, their form of inflorescence (usually a branched raceme) also being shorter, but more spreading, and forming round heads. Though these include some of the best of the newer varieties raised, most of the older varieties which are not of the Orchid-flower-type may also, apparently, be classed under the same head.

In regard to the following order, in which the different varieties are arranged according to height and colour of leaves, it must be remembered that only the height of the foliage is taken into account; even this will be found to vary in different soils and under dissimilar conditions, so that the figures given should be considered only as an approximation. In the case of colours—which most people describe differently—these are given in accordance with the opinion of the writer. The following selection includes what are considered the most distinct and best varieties at Peradeniya, where, however, several more are grown. When known the date of origin or introduction to horticulture is given in brackets after each variety.

Royal Botanic Gardens, H. F. MACMILLAN.
Peradeniya, November 15, 1900. Curator.

(Lists of varieties &c., are omitted.—ED. *T.A.*)

ORANGE-CULTURE IN SOUTH CALIFORNIA.

BY D. WINGATE.

The following excellent article on citrus fruit culture in California is taken from *Chambers's Journal*, and may *ipso facto* be taken as authoritative. We have frequently been indebted to that journal for reliable information on various subjects, which are obtained from the best sources, and are treated in a manner at once clear and intelligible to all interested in the subjects dealt with:—

The culture of the orange-tree has greatly increased in South California within the last few years, despite the many difficulties the growers have had to contend with. Florida was once the largest orange-producing State in the Union; Riverside, a county in South California, is now the largest orange-producing district in the world. Even Covina, a comparatively new orange section, also in South California, last season (1899) shipped 100,000 boxes more than the whole State of Florida. Given suitable soil and plenty of sunshine, irrigation and cultivation have done the rest; and the result to-day is thousands of acres of beautiful trees in bearing, averaging about a hundred trees to the acre.

The celebrated "seedless navel orange," first produced in Riverside, practically gave South California its world-wide reputation for orange-growing; and this orange has completely thrown into the shade other varieties—such as Mediterranean Sweet, Valencia, Ruby and Malta Bloods, St. Michael's, and others less known. Growers have discovered that, for size, flavour, and steady bearing, no other orange can compete with it.

The first year of the orange-tree's life in the orchard is a most critical period in its existence, because it has just been transplanted from the nursery, in which, during its growth for three or four years from the seed, it has been carefully nurtured, and is then worth from 50 cents to 1 dollar—that is, 2s. to 4s. The young trees are planted in the orchard in rows accurately measured off, 18 by 20 feet apart.

The Washington navel orange-tree fruits the first year in the orchard, but it is only said to be in bearing the third year; and from that time it must be fed and watered with the greatest care if, at the age of twelve years, it is to produce 700 lb. or 800 lb. of fruit. Many of the most successful groves are of comparatively old growth, planted some twenty-two to twenty-five years ago; but the health and productiveness of these trees have been maintained by the generous expenditure of fertilisers—often amounting from 1 ton to 1½ tons to the acre, consisting of guano with necessary proportions of potash and sulphate of iron—and also by the regular irrigation in summer every thirty days, and by incessant cultivation or breaking up of the soil which is so apt to become baked by the sun. In the first instance the virgin soil is extremely fertile, but it cannot be drawn upon year after year with impunity; and the pioneers discover this, to their loss, when the decadence of their orange-trees become evident. Young orchards pay while the soil is virgin: but it is no economy to spare either water or manure after the first year or two of bearing, if the orchardist wishes his trees to maintain their productiveness. Some growers state that slight blemishes on oranges denote too rich feeding of the trees; but I believe this opinion is held only by a minority.

The grower has practically nothing further to do with the oranges after they leave his orchard; the sorting, cleaning, grading, and final packing for the market, are in the hands of the association packing-houses—unless, of course, the grower himself has been able to establish a brand and a packing-house of his own. Usually the grower is supplied with boxes by the association, and into them the oranges are loosely packed by his pickers, piled up on wagons, and taken into the packing-house. There the teamster

receives a cheque or credit note for the the owner, and these are kept three or four months, and used to check the amount then receivable from the association. The price depends upon the kind of season, also upon the grade of orange, and runs from about 90 cents (3s. 7d.) or 1 dollar (4s.) up to 2 dollars 50 cents (9s.) a box, the average being 1 dollar 15 cents (4s. 7d.).

The first process at the packing-house is to weigh the fruit, and label it with the name of the owner, then put it aside for the brushers. In large houses the brushing is done by a machine; in smaller houses by boys and girls, who use small hand-brushes. Generally the packing machine is conveniently placed so that the oranges roll down an incline to the sorters' table. Here imperfections only are noted, the quick and critical eye of the sorter rapidly rejecting the "culls" as thoy are called—namely, those oranges even slightly discoloured or blemished. Great piles of these "culls" may be seen in labelled bins ready to be sold to the peddler for 10,25, or even 50 cents (5d., 1s., 2s.) a box; if totally unsaleable they are returned to the owner, and scattered over the orchard and ploughed in as a fertiliser. The next process is that of grading, by which the oranges are sorted according to size. The grader is a somewhat intricate machine. From the hopper at one end, the oranges roll down an incline] by the side of the revolving cylinder, along each side of which are two long slits widening towards the bottom, each size falling through its own special chute into a box below. The three grades of marketable oranges are the fancy, the choice, and the standard. After being graded, the oranges next come nto the hands of the packers, who are marvellously dexterous in their handling. They stand in front of the box to be packed, with the bin of oranges on the right and a bunch of tissue-paper wrappers on the left. Swiftly the right hand takes an orange, simultaneously the left hand seizes a wrapper, a sound of crumpled paper, and—hey, presto!—the orange is in the box. The last layer is left slightly protruding above the side of the box; over this are nailed three or four thin laths, with a space between so that the air may have free access; and from the nailer the box goes direct to the railroad car. Many houses have a siding to the warehouse door. About 360 boxes, weighing 13 tons, are piled carefully into a car; the car is then sealed up, ventilators only being open; a large ticket is tacked to the side to tell where the fruit came from; and at last the oranges are ready for the swift freight train to carry them eastward.

The packing-house are extremely interesting, and in many instances have cost from 10,000 dollars to 15,000 dollars (£2,500 to £3,750) each, being equiped with the the latest machinery, run by electricity, gasoline, or steam-power.

Quoting from the annual midwinter number of the *Los Angelos Times*: "Last spring the assessment returned 2,072,417 bearing orange-trees and 1,227,397 trees in their first year's growth. These citrus trees produced in 1897, in car-loads of 336 boxes each, 7550; 15,1 2 car-loads in 1898, and 10,350 car-loads in 1899. The value of the output of 1899 is given by the Chamber of Commerce as 7,000,000 dollars."

Lemons are always included in these assessments, as the railroad lines make no difference between the two shipments when reporting for the trade; as a rule the shipment of oranges is nearly double that of lemons. To the uninitiated there is little difference at a first glance between an orange orchard and a lemon orchard; there is the same precision in planting, the same glossy leaves, the same fragrant white blossom; but, unlike the orange, rarely does one see the lemon in its yellow rind, for it is picked green, and thus the tree is divested of its beauty, for the green lemon is an insignificant object. Latterly the orange, owing to the rivalry among the growers to be the first to ship oranges from California, has been gathered unripe but these early shipments have brought so little profit to the growers that the fruit is generally allowed to remain three months longer until it is ripe and luscious for the table. Lemons are picked every month in the year; while oranges blossom in April, and the fruit ripens and is shipped from December of that year to June of the following year.

As yet nothing has been done to utilise the large numbers of "culls," but as in France and Italy, manufactories will, no doubt, be started to obtain acids and essential oils from these "culls," when the enormous water-power available in tho mountains, at whose feet so many orchards lie, has been fully developed.

Many difficulties have been encountered in the orange-culture of South California, of which not the least has been the white scale, an insect pest which threatened at one time the entire destruction of the orchard. Hundreds of acres were ruined; the trees seemed to be covered with snow, so greatly infected had they become. The climax was reached in 1888 89, when meetings were held by the growers, and the idea was mooted that some parasitic insect should be found to wage war upon this white scale. Half-a-dozen ladybird beetles were imported from Australia by the Agricultural Department, and liberated in an orchard, and in about a year the white scale totally disappeared. Other scales have caused trouble, but to no great extent. Fumigation is successfully resorted to each tree being covered with a tent, inside which is liberated cyanogen gas. Tho fumigation is done at night to prevent ecomposition of the fumes by the sunlight. It is a curious sight to see a whole orchard enveloped in these coverings, like a huge encampment on a field of battle. Frost, too, is an always expected danger, but it is not experienced to the same extent as by the Florida growers, and frequently two or three years will pass without any damage being done. Wind is almost as great an enemy as frost, for the waving of the branches causes friction between the leaves and the oranges, the latter being more or less scarred thereby. Great loss, too, is caused by the windfalls, hundreds of oranges being lost to the grower before they have come to perfection. Frost, however, may be considered an insidious enemy, and on that account it is more difficult to fight, for its effects are not immediately apparent, instances have occured in which the oranges have actually been shipped eastwards in good condition even to the eye of the grower and the packer, only to be declared unsaleable, as, on being cut open, the pulp was found almost rotten. An experiment to obviate the action of wind and frost has been tried—to house the treef collectively under one immense frame-work of wooden laths, so placed at intervals as to admit sunlight and air, but sufficient to break the force of the wind. This scheme has been carried out successfully on the Everest Ranche, Riverside County, with such good results that the production of 17 acres thus covered in has far exceeded that of any previous year. The more common expedient is to plant eucalyptus trees in long rows across the general direction of the wind, thus forming a breakwind, much in the same way as the tea and coffee plants in Ceylon are protected.

Notwithstanding all drawbacks, orange-growing is a pleasant and lucrative occupation, especially when carried on in such a health-giving and equable climate as that of South California.—*Queensland, Agricultural Journal.*

THE MANURE HEAP.

WHAT MAY BE LOST BY INCOMPETENT MANAGEMENT.

It is of the utmost importance to retain all the fertilising elements of the manure heap. In spite of the knowledge gained by experiment of the losses which accrue from an ill-protected manure heap

it is to be feared that much yet remains to be done before farmers are brought to a knowledge of the appalling loss that takes place annually through careless and indifferent management. Experiments have been made to compare exposed and unexposed manures. It was demonstrated that there is a greater loss of nitrogen and organic matter from exposed manure than from that protected. The former lost one-third of its nitrogen and the latter about one-fifth. Ten per cent more organic matter was destroyed in the exposed than in the protected manure There is practically no loss of potash and phosphoric acid from protected manure. Exposed manure that is rotting may lose about one-sixth of its phosphoric acid, and somewhat more than one-third of its potash. The chief changes, due to fermentation, take place within the first months of rotting, and experiments show that there is no apparent benefit in rotting the manure longer than for a period of three months. When gypsum was used, 3 tons of horse and cattle manure, mixed in equal proportions, were allowed to ferment without the addition of any preservative, by way of comparison with an equal weight of the same kind of manure intimately mixed with ground gypsum (land plaster) at the rate of 50 lb. of gypsum to every ton of manure. These lots were fermented at the same time, in separate bins, inside of a building, the manure being fresh and compacted as closely as possible, being undisturbed for four months (July to November), when they were weighed and analysed. The results showed that gypsum retarded, to a certain extent, the destruction of animal matter. The amounts of nitrogen in both lots were the same, no useful result from the application of gypsum being observed. The proper place to use gypsum is in the stable, as it is in the stable that a great loss of ammonia occurs.

MANAGING THE HEAP.

When manure is kept moist, the loss of potash cannot be prevented without a water-tight, non-absorbent floor, but when the manure heap is kept compact and moist there is not any considerable loss of ammonia. It is evident that if manure is exposed to rains, no matter what the absorbent materials may be, the water cannot pass down without carrying soluble matter with it, and when the water reaches he bottom it must either go down into the ground or flow off in some direction. Whatever substance has been dissolved out of the manure remains in the water and passes off with it. The remaining materials of the heap may be almost worthless, but they receive just as much attention, and as much abonr is bestowed in hauling and spreading the substances as though the loss of soluble matter had not occurred. It has been shown that when manure is compacted, and the air kept out, the fermentation of the mass is not so rapid, but when loosened and the air admitted, fermentation begins, because the oxygen of the air influences chemical action. When manure is under shelter the rains do not dissolve the plant food from the heap, and when the liquid manure is thrown upon the solid portions by pumping or otherwise, the solids become absorbent and assist in retaining the liquids. All locations for manure should have water-tight bottoms, for then any accumulations of liquids can be retained and added again to the heap, and tanks should be arranged into which all liquids from the stable should flow, so as to save the soluble matter. If the heap is then too wet, more absorbent material of some kind should be added.—*Farmer and Stockbreeder.*

COOK ISLANDS.

In a recent report on the trade prospects and social condition of the Cook Islands, the British Resident, Lieut.-Colonel N. E. Gudgeon, says that during his late visit to the outlying islands of the Federation, he found it necessary to comment in strong terms on the fact that at least two-thirds of the area of the group was practically unproductive, owing to the owners of the soil having neglected to plant the coral formation with cocoanuts, and to their having done comparatively little to improve even the most fertile lands. He also pointed out that, in the event of a hurricane, many of the old cocoanut trees would be destoryed, and therefore the islands would have absolutely no export for the ensuing eight or ten years, since they had no young trees planted to take the place of those that would be destroyed. He could not say that he expected any good result would follow his remarks, inasmuch as the Cook Islanders were too easy-going to take into consideration prospective privations or benefits. But he was now in a position to report that his view of the situation had impressed the native owners of the soil to this extent, that they were planting both cocoanuts and bananas in very large quantities, and therefore there was a prospect that at no very distant date the trade of these islands with New Zealand would be very largely increased, for there was no reason why the export should not be fivefold the present quantity.

He regretted that he had to report that the coffee crop of last year, which at one period bade fair to be abundant, had proved almost a failure. Late in the season the trees were attacked by the Ceylon leaf blight, which it would seem was introduced by a Mr. Dodge, who, about the year 1896, imported several hundred coffee plants to this Island; the result had been that Raratonga was not likely to appear as an exporter of coffee for many years to come, since the whole of the old trees had been entirely killed. Fortunately, this blight had not reached the Islands of Mangaia or Aitutaki, but that was of small moment as compared with Raratonga, since the last-named island had always exported ten times the weight of coffee produced by the two former. The failure of this important item of export had made it imperative that copra should as much as possible take its place, and, therefore, that coconut planting should be encouraged.

There was at present every prospect of a very large orange crop, and he confidently anticipated that the amount available for export would be at least twice that of last year. That was a position which might easily be maintained or exceeded, if the native owners could only be brought to see the necessity for pruning and artificial manures. At the present moment the natural impression on the mind of any stranger would be that orange trees were grown in Raratonga not so much for their fruit as fo timber purposes.—*Imperial Institute Journa*

THE RUBBER INDUSTRY OF SIERRA LEONE.

The Kewattia, or rubber tree of West Africa, is one of the most beautiful trees of the forest, growing usually to the height of from forty to sixty feet. Its leaves are from four to nine inches in length by from one to three inches in width, oblong and tapering towards the ends, supported by a stem from eight to nine inches long. There are several species of vines which yield a grade of rubber inferior in some respects to that obtained from the trees; however, when gathered with care, this commands a ready sale. The United States Consul in Sierra Leone says that the supply of Freetown market for the most part comes from the hinterlands of Sierra Leone and from the Foulah country in the French protectorate farther in the interior. That which come from the Foulah country is limited, owing

to the export tax of about three half-pence per pound placed by the French upon all rubber sold by natives outside their protectorate. Notwithstanding this prohibitory restriction upon the native rubber vendors, there are several regular traders who furnish to the market a good quantity of Foulah rubber every season. This rubber is almost invariably adulterated with clay, yet it grades well in the local market, and brings a better price. In former years Freetown was a better depot for rubber than at present, but since the establishment of the French protectorate, which controls the output of the valleys of the adjacent northern rivers, the trade has been directed to the French port of Konakry, seventy-two miles distant from Freetown. The dry season from November until May is the gathering season. Native chiefs supervise and control the sale of the output of their respective territories.

The method of gathering the sap is very simple. The body of the tree is tapped and the juice flows until it is exhausted; later, new incisions are made. The juice is usually caught in cups or calabashes attached to the tree, so as to prevent impurities appearing in the rubber. The neglect of this precaution is responsible for a percentage of the incidental adulterations, of otherwise good rubber, frequently found in the local market. The native, in his efforts to increase his stock, frequently bleeds the root as well as the body of the tree; this is fatal to the tree. The product is known as "root rubber," and, besides containing large quantities of impurities, is very inferior to any grade of tree rubber, and would be refused altogether by local buyers in order to discourage the destruction of the forests, were it not for the sharp competition for export trade. The rubber is brought to market overland by caravans of natives, or most frequently by canoes. These cargoes are generally consigned to some particular agent, though they are often sold to the one making the best offer. For convenience rubber is arranged in three classes or grades, known as No. 1, No. 2, and No. 3, the character of the tissues and freedom from impurities being the determining factors, as well as the kind of adulterants. Considerable ability on the part of the agent is necessary to enable him to properly assort and select the rubber and to detect adulterations. There are two classes of these—incidental and intentional. The former is the result of carelessness on the part of the gatherers who do not use proper receptacles for the juice. Intentional adulterations are due to efforts to increase volume and weight by use of dirt, sand, bark, and sometimes stones. Another species of fraud is the mixture of other non-elastic gummy substances with pure juice; still another is to soak rubber by placing it in pits close to the water for a long time. Rubber so treated is seriously injured in quality, and at the same time increased in bulk and weight.

The Colonial authorities, as well as the Chambers of Commerce, are endeavouring, by proper instructions to those concerned, to discourage these abuses and to emphasize in every way possible the importance of improving the quality of the rubber brought to Freetown market. There is being inaugurated by the Governor and officials a plan to foster the planting of rubber trees and vines in the colony. To this end they have caused to be issued pamphlets of instructions in regard to seeding, transplanting, etc., through the departments of agriculture and horticulture. It is hoped that there will be a decided improvement in the quality and quantity of the exports in the near future. The value of the rubber exported from Sierra Leone in 1898 was about £51.000, of which the amount shipped to Germany was £6,700. The remainder went to England. —*Imperial Institute Journal.*

THE SUGAR INDUSTRY IN INDIA.

[THE PROFITS OF SUGAR-CANE CULTIVATION AND OF CANE-SUGAR MANUFACTURE IN INDIA BY F.N.G. GILL.]

Now that the indigo industry of India is in such a depressed condition, and it has become a question with the planters of adopting cane cultivation more or less, the writer's experience may be of interest to them and others owning suitable land.

The sugar planter's business should be separate from that of the manufacturer, and where it is not it would be well if the planter treated the two branches of the business as separate businesses, each with its own account. In the present paper this course will be adopted.

Making jaggery will not pay if the planter can sell his cane to a central factory on the basis of R16-8 per 500 lbs. of jaggery yielded by it. Results of ryots' milling in South-Arcot was found to be 72 tons of cane crushed by two mills in twenty-four hours and obtained 18,744 lb. of jaggery, equal to 3 75 candies of 500 lb. (11·62 per cent on cane):—

	Rs.	A.
3·75 candies of jaggery at R16-8	61	14
Feed of 12 pairs of bullocks at 6 as ..	4	8
15 candies firewood at R1-4	18	12
4 men to mill, 8 men to boil, 2 men to collect bagasse, and 2 sundry men, day and night working	3	0
12 gunnies at 3as 3p	2	7
Sundries, repairs and interest on capital say	4	7
	R95	0

making cost on spot R25 5-3 per candy of 500 lb.

And to make the concrete with large steam mill, crushing one ton of cane in four minutes, and Fryer's concretor, the writer found the cost of the concrete R24 per 500 lb. bagged and on the spot. The ryots' working shown above is unnecessarily wasteful in fuel, even for open boiling; but as the jaggery in quantity would probably not fetch more than R18 to R22 on the spot, there is little hope of a margin in any case in such system of work.

The following are the results for 18 years 1879 to 1896, of cane cultivation in the South Arcot district of the Madras Presidency, obtained by native ryots with "Ribbon" cane grown under channel irrigation, and manured chiefly with ground-nut oil-cake, and by the richer ryots with indigo trash. The cane suffered considerably from water logging through neighbouring paddy cultivation, and its seasons of planting and cutting were forced into unfavourable seasons of the year by the requirements of paddy cultivation. The whole of the cane of the area of cultivation referred to was sold to the sugar-mills on the basis of the weight of jaggery (concreted juice) yielded by the cane. It might be good or it might be indifferent—really bad cane

was rejected—jaggery, but the system was very much better than that of buying the cane outright, as it gave the ryot a strong, though not a perfect all-round, interest in the quality of his cane. The juice of each ryot's cane was accurately measured, and 15 gallons of it were boiled down to concrete over an open fire, in the country fashion, and the weight of concrete obtained, together with the gallons of juice measured, afforded all the data required for the settlement of the party's account. Such a system as this, however, would not go far enough with European sugar planters, even though they were the owners—as they should be—of the central factory. Nothing short of the measurement of the juice and its polarization (to arrive at the quotient of purity or per cent of sugar in apparent solids) would be found to be satisfactory to all interests

Results of Cane Cultivation in South Arcot for 18 years during which the extent of the cultivation and the results varied :—

	From	To	And averaged
Extent of cultivation ...	129 acres	1.728	806½
Density of juice ...	9 Baumé	10·2	9·4
Cane crushed per acre ...	9 8 tons	18·2	15·0
Jaggery, concreted juice per acre	1·167 tons	2,189	1·754
	5·23 candies	9·80	7·86
Jaggery, per cent on cane	11·9	11·6	11·7

The weight of cane shown above is a closely approximate figure, arrived at on the basis of the jaggery being 11·7 per cent of the weight of the cane, the juice being of a density of 9·38 Baumé and being obtained at the rate of 140 gallon per ton of cane, equal to 66·7 per cent of juice.

If R 16-8 per 500 lbs., sayR74 per ton, be received for the jaggery in the cane, the gross proceeds per acre, it is seen may vary from R 86-6 to R162 with R129-12 as an average. What the cost of cultivation, cutting and carting-of the crop are, and thence what the profit is, must depend entirely on local circumstances of distance of the cultivation from the factory, cost of land-rent &c., labour, manure, and seeds. On the average, cane cultivation pays well if the jaggery in the cane can be sold for R16-8 per 500 lbs. delivered in the factory, supposing that the cartage to the factory does not cost too much. With yield of 11·7 per cent jaggery on the cane, the ton of cane will give only 262 lbs. jaggery, and therefore 4 annas per cart load, and with three cart-loads to the ton, will make a cost of R1 per 500 lbs. of jaggery, or R7-14 per acre of average cultivation. The profits of the central factory should be very considerable, buying the cane from the planters on the above, or somewhat analogous terms; and working with multiple effect evaporators, vacuum pans, crystallizers in movement and quick-speed centrifugals, and with the factory designed for the conditions of the country. For a factory capable of dealing with 400 tons of cane a day and working for 100 days, equal to 2,666 acres of cultivation cleared in the season, probably 5 lakhs of rupees capital for building and machinery would be sufficient, and such a factory working an inferior cane with a refining value of the contained jaggery of 62·3 would turn out the bagged dry sugars at about R34 per 500 lbs.; valuing the treacle made at R6 per 500lbs. and allowing 7 per cent on the capital for interest and depreciation, and including cost of permanent establishment for the remaining 265 days of the year. The cost would run out:—13,083 candies sugar, and 7,560 candies treacle.

	Rs.	A.
Materials (21,000 candies jaggery) R16-8 and yield 62·3 per cent ...	26	8
Repairs and renewals	0	8
Establishment	2	0
Fuel	2	6
Gunnies, inner-bags and twine ...	1	3
Filter-bags and sheaths	0	2
Oil and sundries	0	4
Charring	0	8
Permanent establishment (in slack season) and insurance	1	5
Interest (5 per cent) and depreciation 2 per cent on R5,00,000 at 7 per cent	2	11
	37	7
Less 1,560 candies treacle at R6 ...	3	7
Net cost...	R34	0

The sugars would realise on the spot a minimum average price of R48 per 500 lbs., leaving a profit of R14 on 13,083 candies equal to R1,83,162. The realisation of the treacle, however, is a difficult matter, and is generally impossible in the working of an inferior cane without a distillery, which to deal with the 7,560 candies treacle would have to be capable of turning out about 20,000 gallons proof-spirit a month, and an outlet for this spririt would have to be found. The alternative, which would still leave a very good profit, of throwing away the treacle, in part or in whole, is not always possible, as there may very well be no place into which treacle in quantity can be run without causing a nuisance. If a distillery can be worked it can make its own profit out of the R6 per 500 lbs. treacle paid the sugar house, the spirit costing only between 6 annas and 7 annas per gallon proof, including 10 per cent 5 per cent depreciation, as it would work all the year round interest and depreciation on 1½ lakhs of distillery building and plant.

If the "Ribton" cane be not water-logged, be planted seasonably in favourable soil, and be sparingly manured, its jaggery contents may have a refining value of over 74 per cent as also may the "Dikchan" Dr. Leather's analyses of Shahjahanpur, and the soft green cane turning mellow-yellow when dead ripe of Coimbatore; and then while the weight of cane per acre may be considerably less than more stimulated growth the greater value of the jaggery contents would permit of the central factory paying a proportionate price for it. Thus: 15,540 candies sugar and 5,040 candies:—

Gross cost would be—

		Rs. A. P.
R37-7@ × 62·3	..	31 8
74·0		

And treacle credit—

7,560 × 6		
15,540	...	2 14 8
Nett cost ...		Rs. 29 9 7

The difference between this and R48, R19-6-5 would be the profit per candy of sugar working the better cane—

		Rs.
15,540 cds. of sugar at Rs. 19 6-5 ...		3,01,491
5,040 cds. of treacle at Rs. 6 ..		30,240
		3,31,731
13,083 cds. of sugar at R14 ...	R1,83,190	
7,560 cds. of treacle at R6 ...	45,360	
		2,28,550
Difference ...		R1,03,181

equal to R4-14-7 per candy of the 21,000 candies of jaggery which the sugar works can afford to pay the planter for such cane.

On the other hand, the planter can afford to grow as little as an average of 11 tons of cane per acre at R21-6-7 per candy of jaggery, as against 15 tons with the jaggery at R16-8.

There is another possibility with the better cane—that of working the treacle for its sugar through a preliminary treatment of the cane juice and a final treatment of the treacle, and so being entirely independent of a distillery for the realisation of the treacle. As regards the preliminary treatment, the writer has not worked it on cane juice, but has worked it on several thousand tons of jaggery in refinery blow up and scum liquors and with glucose content of 4 and 5 in the 100 apparent solids, equivalent to, in the case of ordinary constituted cane juice, ¾ to 1 per cent glucose in the juice, and with the result that the treacle contained only 1·4 glucose in the 100 solids, or 1·2 per cent and accordingly quite fit to be treated by the final—the Steffen Lime Separation—process. The writer has not worked this process but he went to Germany to inquire about it in 1885, and in 1891 he went to Europe specially to go into the question of the advisability of its adoption in consequence of the oppression and vexation to which the business was subjected by officials through the distillery. The result was that the writer could not recommend the immediate adoption of the process which would have involved the outlay of 1½ to 2 lakhs of capital, and with a distillery already on hand; and when, too, it was found that what was urgent was the adoption of crystallisation in movement. In the end this view was not justified and with his experience now the writer would not recommend the investment of capital, under any circumstances, in a business dependent on official sufferance in India, where the revenue official of heterogeneous origin and early training is invested with absolute power in anomalous capacities and is free from the restraints of public opinion.

From the foregoing it follows that the writer would strongly recommend the adoption of the Steffen separation process in sugar making in India, where possible. Applied to sugar-cane juice with the preliminary destruction of glucose referred to, the position would be as follows, working the better cane with juice containing a maximum of one per cent glucose.

Crushing 400 tons a day and obtaining 66·7 per cent juice* containing 1 per cent glucose there would be obtained 8 7 tons of treated treacle, requiring 5·6 tons of lime for its treatment, and giving in the saccharate formed—and which would be used for the destruction of the glucose in the following day's cane juice—rather more than twice the lime required for such purpose. Under the circumstances the lime expense is limited to the treatment of the treacle.

The following would be the cost of treating a day's out-turn of treacle:—

		Rs.	A.	P.
39 candies treacle at R6 ...		234	0	0
Establishment: 30 men at 3as. R5 10				
Supervision 10 0				
		15	10	
Fuel, 10 cwt. coal (only pumping, stirring and lime-grinding required, decomposing the saccharate in the cane juice) at R15... ..		7	8	0
Filter-bags		9	0	0
Lighting and repairing		10	14	0
Lime, 5·6 tons at R11-8		64	6	0
40 I. H. P. for cooling machine, at 4lbs, coal per hour, for 10 hours		10	11	5
Labour, oil, and sundries ...		4	8	0
Fitting etc.		1	8	0
Interest and depreciation (7 per cent on R10,000)		70	0	0
	Rs.	428	1	5
Value of 16 candies rough sugar in the cane, which if separated would have an average polarisation of 94 7, at Rs. 35-8 ...		568	0	0
Value of 5 candies of treacle, say, nothing				
	Rs.	139	14	7

or, say, R140 per day, R14,000 for the the season, but from which has to be deducted the cost of the preliminary process of the destruction of the glucose in the juice, beyond the cost of the lime met in the final process. Plant, consisting of two large gas pumping engines (to take this boiler-flue gases), and gas-scrubbers, three large tanks pipes &c., and more filters would be required, involving a capital expenditure of about R30,000 which at 7 per cent is equal to R2,100 debt which on 15,540 candies of sugar.=R0-2-3; and labour, fluel for gas-pumping, and more filter-bag wear, R0-3 0; per candy or R2,913 12, making a nett profit on the process of R14,000 less, say, R2,814. equal to R11,086.

The Steffen separation process, it may be mentioned, consists in combining the sugar of the molasses with lime to make an insoluble saccharate which can be washed free from impurities in a filter press. It necessitates the employment in the tropics of an ice machine, used simply as a cooling machine for keeping the temperatures of the liquors and water in use within 60° **Fahr,** but as ice machines are at present made this is not a serious matter, and the cost of it has been fully provided for in the above statement.

It will be noticed that a large quantity of lime is required. Further, the limestone burned must be very pure, and it must be burned on the spot. A very good source of lime would be cockle or such shells, washing them before burning if sea shells.

Summary of profits: *Working 400 tons cane a day for 100 days*

1 Taking the inferior cane with its contained jaggery of 62·3 refining value, costing R16-8 and

(*a*) Supposing the whole of the treacle is worked

* This was the yield ascribed with a density of juice of 9 3° B, but the juice of the better, non-stimulated growth of cane would have a considerably greater density, and hence, probably, the yield of juice would be greater; but this is a detail that need not be considered.

in a distillery, and the spirit sold at 1 anna profit per gallon proof, equal to a selling price on the spot of, say 8 annas.
(*b*) Supposing there is no distillery, and that the treacle can be, and is, thrown away.

	(*a*)	(*b*)
13,083 cds. sugar at R14	R1,83,190	R1,83,190
216,000 gals proof spirit at 1 anna	13,500	..
Less value of 7,560 cds. treacle credited	...	45360
	R1,96 690	R1,37,830
On capital of	6½ lakhs=30 2%	5=27 5%

2 Taking the superior cane with its contained jaggery of 74 refining value, and supposing that the treacle is worked by the Steffen process as described :—
(*a*) Paying R16·8 for the jaggery in the cane.
(*b*) Paying R21-6·7 for the jaggery in the cane.

	(*a*)	(*b*)
15,540 cds. sugar at R19·65	R3.01,491	R3,01,491
Profit of the Steffen process ...	11,006 ,,	11,086
	3,12,577	3,12,577
Less R4-14·7 more paid on 31,000 cds. ...	...	1,03,181
	R3,12,557	R2.09,396
On a capital of R6,30,000 ...	49·6% ,,	33·2%

It is a question whether, in regard to the profits shown in working the Steffen process, if the treacle ultimately left would not have a considerable value for manurial purposes, and certainly the lime sludges (and wash waters) under favourable conditions of elevation of factory in respect to neighbouring cultivation would have such a value beyond the cost of their distribution.

All said and done, however, no process for the profitable absorption of treacle can beat that of the human stomach and it would be of immense value to the sugar industry of India; and to the working classes of India, if the popular consumption of treacle could be brought about: Cane treacle at 5 pies a seer (2·05 lbs) on the spot, would be a remarkably cheap food stuff, and would give a realisation to the sugar works of R6-8 per 500lbs. for its treacle.—*The Indian Agriculturist.*

ARROWROOT.

The plant is propagated by division of the tubers, or by means of seeds. The sets are planted in rows 3 feet or 4 feet apart and 3 feet apart in rows; the drills 6 inches deep. The crop matures, say, in ten months. The bulbs may, however, be left in the ground for a moderate time without losing their qualities, but if to left too long, especially if rain has fallen, the plants begin to grow, and from that time onwards the quantity and quality of the arrowroot obtainable from bulbs then used may be expected to diminish. The land should be ploughed and subsoiled and thoroughly tilled, for though very easily grown, like many other economic plants, the better the treatment it receives the better are the eventual results. The manner of treating the tubers is to firstly place them in a large revolving washer so constructed that the tubers are always gradually passing onwards to a grater, from whence the material passes into a long shoot, the bottom of which is practically a long sieve, being constructed of fine wire meshes. As the material passes along with the running water, the starch or arrowroot is gradually falling through this sieve on to a sloping wooden shoot below, whereby it is gradually run off into wooden troughs and allowed to settle. As the arrowroot settles, the dirty water is run off, and fresh, clean water run into the troughs, in which the arrowroot is again stirred up. This process is repeated several times until the arrowroot is sufficiently clean and white. It is then taken from the troughs and laid out on calica dryers in the sunlight, and here it remains until completely dry and fit to bag as marketable arrowroot. Ordinarily, it takes two days of good sunshine and wind to dry the product, which is not spread too thickly on the dryers. Troughs of galvanised iron should not be used if bright, white, marketable arrowroot is desired. On 26th August, 1897, a small area was planted with *Canna edulis*, at farm in New South Wales. The plants appeared above ground on 18th September, 1897, and grew vigorously from that time until harvested on the 8th August, 1898. The crop raised was equivalent to a return of 33 tons per acre of tubers. One ton of these tubers was taken to the mill and there treated, the result being 240lb. of good, clean, white arrowroot. Some growers of arrowroot do not attempt any deep cultivation for the arrowroot plant. In the case of the experiment mentioned, the land was subsoiled and deeply ploughed, and the bulbs were cleaner, heavier, and larger than tubers ever seen elsewhere locally, and contained more starch, judging by the amount of arrowroot abtained. Probably, it is a satisfactory and payable crop where the methods are modern and complete, not crude makeshifts, especially in the matter of washing and drying the arrowroot. The result of this experimental crop would work out as follows :—

33 tons tubers to the acre. One ton of tubers gave under treatment, 2 cwt. 0qrs. 16lb.

33 tons of tubers equal 3 tons 10 cwt. 2qrs. 24lb., which, at £14 per ton, is equal to the sum of £49 10s. per acre.

So far as Jamaica is concerned, it would all lie in the making of a fine enough and white enough arrowroot that people might try as being at least as good as St. Vincent or any other arrowroot imported here *Journal of the Jamaica Agricultuarl Society.*

EXTRACTION OF RUBBER.—A novel process was described recently before the Society of Civil Engineers of France for the extraction of india-rubber from the tree. The bark and roots are cut up and soaked in dilute sulphuric acid. The effect of this is to decompose the woody portions without affecting the india-rubber. In this way a division is made between the valuable rubber and the rest of the bark and roots, and it is claimed that the rubber so produced it quite pure. It was stated by the author that 1 lb. of india-rubber could be produced by the process at a cost of about 2½ l.—*Engineer*. Two French chemists have discovered a process by which rubber may be obtained from Landolfia vine, which grows wild and luxuriantly in all parts of Africa The process of tapping the Landolfia is impracticable, as the flow of rubber hardens too quickly. By the process of M, M, Arnand and Verneuil, the vine is crushed in hot water, by which means all the rubber which it contains is extracted —*Queensland Agricultural Journal,*

OUR PEARL FIRHERIES:
MR, SAVILLE-KENT, F.L.S., F.Z.S., TO THE RESCUE.

We direct attention to the long and interesting letter (on page 541) with which Mr. Saville-Kent has favoured us by a late mail. It explains the circumstances under which his telegram was forwarded to our office; and we are glad to see that he had previously addressed the Governor, sending His Excellency full particulars of his capabilities and experience with reference to the undertaking of an enquiry into, and, if possible, resuscitation of, the Ceylon Pearl Fisheries. There can be no doubt of the unequalled position held by Mr. Saville-Kent in reference to exploration in this direction (Pearl-yielding and Pearl-shell oysters) outside of the United Kingdom and of Europe. No other scientist of the day—English or foreign—has had the same experience. This is testified to by the couple of elaborate and splendidly illustrated folio volumes issued by Mr. Saville-Kent giving the result of his labours, these being entitled:—"The Great Barrier Reef of Australia" (a copy of which is in the Colombo Museum) and "The Naturalist in Australia" (a copy of which is possessed by Mr. Oliver Collett, of Watawala, and also by ourselves). We suppose that the scientific world fully admit the great value of these two books and of the prolonged abours, keen observations and successful experiments recorded in them in connection with Pearl and other oysters. Why then, it may be asked, was Mr. Saville-Kent's name not forwarded to the Secretary of State by Professor Ray-Lankester? This, we think, is partly explained in the letter before us, and it is for that reason that we have thought it wise to give certain particulars which the writer intended more especially for our own information; but which we think, in Mr. Saville-Kent's own interests, had much better be made known, since already we had heard remarks made about his having fallen out of sight in the scientific world of late years. This is explained by his unfortunate connection with a syndicate started for commercial purposes to exploit a portion of the Australian Pearl Banks—which project, after much trouble and expense to Mr. Saville-Kent, entirely collapsed—and also to the fact that the younger generation of scientists are not so well-acquainted with him and his work as were Sir Wm. Flower and Mr. Huxley, both, of course, deceased. It seems to us that Mr. Saville-Kent has a plain, straightforward story to tell us, and that it will be a pity if his claims to service in the Ceylon Pearl Oyster Enquiry were put entirely on one side. At the same time, we are by no means blind to the special qualifications and great scientific authority of Professor Herdman of Liverpool; and in the interests of the Colony we should feel quite safe if he were offered, and accepted, the appointment. But there are certainly two points to bear in mind:—(1) that Professor Herdman has had no previous experience of the Pearl-Yielding Oyster or of Oyster Fisheries outside of Europe; and (2) that he is not likely to be able with his other engagements, to give continuous time or attention to the Enquiry in Ceylon. In other words, he cannot give up his University duties which occupy, perhaps, six months of each year, apart from other engagements. It is quite possible, therefore, if Mr. Saville-Kent be eager for the Ceylon appointment—as after his Australian experience, he may well be expected to be—and will make known his claims in the proper quarters at home, as he has already done to the Governor of Ceylon,—that Professor Herdman would himself support the appointment, or withdraw in favour, of the gentleman who has made a name as the "Naturalist in Australia."

It will be seen that Mr. Saville-Kent is prepared at once to apply his past experience to the work required and feels sanguine that fisheries of the larger Australian mother-of-pearl oysters (which often contain valuable pearls) could be established in our waters; while he has also dealt successfully with the smaller oyster, *M. imbricata*, which is closely allied to our *M. fucata*. We have suggested the shores of the outer harbour at Trincomalee—or Tamblegam Bay—as a suitable spot for experiments in Pearl Oyster culture. But Mr. Saville-Kent's practised eye, in conjunction with the great local experience of Capt. Donnan, would speedily decide which was the best site, whether in the Gulf of Mannar or on the Eastern side of the island.

It only remains to mention that if, as we suggested at the local Asiatic Society's meeting, the Indian authorities would agree to join with the Ceylon Government in this Pearl-Oyster Enquiry and Experimental Culture, it might be possible to secure the counsel and aid of both Professor Herdman and Mr. Saville-Kent,—to have the former as Consulting Naturalist, coming out for a few months each year; while Mr. Saville-Kent remained continuously in charge of the work undertaken. We think the interests at stake would fully warrant such a course. Ceylon has had as much revenue as R860,000 nett in one year from her "harvest" of pearl oysters, and that so recently as 1891; and India has also had handsome returns in the past; while there are incipient fisheries at more than one point, besides the Gulf of Mannar, in her wide-extending coast between Kurrachee and the Malay Peninsula. Indian trade also benefits by the Pearl fisheries in the Persian Gulf and any good results from the proposed Scientific Enquiry could be freely utilised. If his Excellency the Governor can only succeed in interesting Lord Curzon in the matter, an investigation on the wider and more satisfactory scale might well be arranged for; and there can be no doubt that conclusions arrived at by Professor Herdman and Mr. Saville-Kent in conjunction, would be accepted by the whole scientific world as well as by the Governments concerned, as final—more especially as, we should hope, these results or conclusions would justify the outlay incurred by pointing to a revival of prosperous Pearl-oyster fisheries in Gulf of Mannar and at other points.

IVORY CARVING IN ASSAM.

Mr. James Donald, I.C.S., Assistant Commissioner, Golaghat, in the course of an interesting monograph on this subject says :—Once an important art in the days of the Ahom rajas, ivory carving has since Assam came under British rule gradually declined. In those past times industry throve, the workers patronised by the rajas and leading men of the court reserved, as a return for their work, free grants of land and labour. In consideration for these privileges, a special class of workers known as Khanikars worked solely for the rajas. This would seem to indicate that the work in those days was much valued.

In 1891, the census showed four ivory carvers in the whole of Assam, three in Kamrup, one in Sibsagar, while the Deputy Commissioner of Sylhet now states—"Ivory carving is a practically extinct art now in Sylhet."

Bringing the information up to date we might safely say that there is but one man in the whole of Assam whose occupation can be described as "Ivory carver," Fiznur, Mussalman, of Jorhat. From an important flourishing and honourable industry, it has, in the space of 70 to 80 years, been reduced to the work of one man, and that spasmodic.

But there are others who, while dependent for their living on other occupations, still possess a knowledge of the art. In the case of all, however, the work is spasmodic, and entirely dependent on occasional orders received—generally from Europeans—which orders they do not always take the trouble to execute. The ivory carver in Sylhet (his principal occupation is that of "goldsmith") whose speciality is fans, has received but one order for fans during the last ten years. No other order has he received either from Europeans or Natives. And the others are in a similar position, although in the case of one or two more frequent demands have been made for their work.

The number of persons in Assam, who are acquainted with ivory carving, may be roughly put down at fifty. Of these about forty depend for their living on agriculture, while the others have become carpenters or brass-workers.

The nature of the articles turned out depends on the demand. Practically the whole of the work done is the result of special orders, and generally any article ordered can be executed, The representative of the industry in Sylhet makes a speciality of fans, while the Jorhat worker has a preference for salad spoons and forks and back-scratchers. The latter carver, however, confines himself slavishly to these three articles and will not execute orders for other than these. Small boxes, paper knives, dice, chessmen, combs, handles for knives, umbrellas, &c., bracelets, rings, and models of animals represent the general nature of the work. In these articles there is generally some ornamentation. Figures of animals as elephants and fish, and drawings of creepers and flowers, are common objects of ornamentation. Rubies and emeralds of a cheap nature adorn many articles as spoons, forks and bracelets and are used for eyes in the case of animals. Silver and gold, and brass, too are occasionally employed. In Fiznur's case there is little or no variety in the ornamentation.

Ivory carving once flourished because nurtured and, as I have pointed out, because not altogether an optional industry. It decayed when both these influences ceased. It has now reached the point of extinction, not so much because there is no demand, but rather because the workers, from want of energy or material, have so hidden their talents, that but few know of their existence.—*Pioneer*, Dec. 12.

PLANTING IN PERU:

COFFEE AND OTHER PRODUCTS.

(From a Planting Correspondent.)

Oct. 27th, 1900.

We are fully 4,000 feet above sea level, with a perfect climate ; neither wind nor great droughts to contend against. The roads are pretty good and are improving and a railway is expected to be laid soon to come within a short distance of this valley. To the European markets we have very low freights, and as Peruvian coffee has taken second place in name, and first price in the German markets, and first place and first price in London, namely, an average of 70s. per quintal (100 to 112 lb.) this gives general satisfaction. Also by this mail came *from the Paris Exhibition—2* awards of gold medals to the Haciends, *La Perla and St. Olaya*, on either side of this one. These are now in their sixth year, giving full crops of 1,000 quintals. This estate is in its third year, and great expectations may be realized if the weather keeps favourable, such as we now are enjoying. There are many questions I would like to ask, but especially these two :—Have you seen the results of the trial of Jadoo fibre, and is it such a marvellous factor ? I would like to see a Company formed to take up land just here, or alongside of the Peruvian Corporation. Their land is a day's journey farther inland. It would open up this country, as labour is cheap and sufficient, and the Indians and Cholos are strong, healthy and active, and very peaceable, and with the courtesy of the Spaniard. Their daily pay is 50 and 60 centavos; all, or nearly all, are contracted by regular contractists (engauched) whose commission is 10c per tarea that they contract to work. We will employ from 15 to 40 men and 20 to 30 women during harvest.

Readers of the *Tropical Agriculturist* might and it to their advantage, to come and invest in this neighbourhood again.

BAMBOO MANNA.

One of the last numbers of the Agricultural Ledger contains an interesting description, by Mr. D. Hooker, of bamboo manna, and a report by Mr. A. E. Lawrie, a Forest Officer in Chanda, of its discovery in the Central Provinces. Mr. Hooper points out that bamboo manna has been known for many years among native physicians in India, but the term is generally accepted to represent the silicious concretion found in the culms of the bamboo and called *banslochan* or *tabashir*. This, he adds, " is a peculiar substance, and its origin is not satisfactorily determined. It occurs inside the stems of various species of bamboo, either in thin fragments or in masses about an inch thick. It is often mixed with dead insects in the stems, but when calcined it becomes opaline or pure white. Extraordinary properties have been attributed to it, and it is said to be tonic, cooling, aphrodisiac and pectoral, but from its composition it would

appear to be quite inert as a medicinal agent. At any rate, the trade in the drug has decreased within the last few years, and its collection by wild tribes is not by any means so active as it formerly was." The Sanskrit name for *tabashir* is *trakkschera*, or bark milk, an exudation on the out-ide of, whereas *tabashir* is always found inside the stem. Besides *tabashir* is quite tasteless, whereas the bark milk is sweet, so that the two substances are not identical, the confusion, Mr. Hooper suggests, being due, probably, to *tabashir* being called *saccharon* by Dioscorides and Pliny, the substance to which the ancients gave this name having none of the properties of sugar, and being used in quite a different connection, especially as a medicine. The bark milk exudes from the modes of certain species of bamboo and becomes solidified into pure sugar. Mr. Hooper adds that "Indian travellers, and the most recent writers on the subject of bamboo, have never recorded the spontaneous excretion of a substance similar to manna appearing on the stem." Mr. Lawrie, in his report, states that in November last the entire bamboo (*Dendro calamus strictus*) areas of forest for some miles along the Wardha river flowered, and shed ripe seed from early in January, a very unusual occurrence. This seed—which has been known to sell for 40 to 50 seers per rupee while wheat was selling for 12 seers—was a great source of food for thousands of poor people during the famine, and kept them alive for about three months. In February, Mr. Lawrie noticed that the culms of the clumps of bamboos growing in poor soil in the drier portions of the forests were streaked all the way down with what appeared to be a white, brittle gum, similar to what which exudes from *Odina Wodier*. The Gonds had never seen it before, so Mr. Lawrie collected some, and tasting it found it to be perfectly sweet. "On reaching camp, I got hold of a number of villagers, both Gonds and others, and on enquiry they told me they had never seen or heard of this gum. I passed through a number of similar stretches in which the bamboos were covered with the gum. This sugary deposit only extended for about five feet along the culms and was entirely absent towards the tops. It was found both at the nodes of the bamboo as well as on the stems between the nodes." Some of this manna was sent to Mr. Hooper, who found on analysis that it contained 95·63 per cent of sugar related to, if not identical with, cane-sugar, was quite wholesome, and might with impunity be used for cooking or making sweetmeats in the place of ordinary sugar. Similar saccharine exudations are afforded by many other trees in the East, while three descriptions of manna are imported into Bombay, one obtained from the camelthorn, one from the tamarisk, and one from the shrub *Cotoneaster nummularia*, all of which grow in Persia. Manna is also obtained from the *Eucalyptus viminalis*, which grows on the Nilgiris.—*Madras Mail*, Dec, 14.

SEYCHELLES AND MAURITIUS TRADE.

The prosperity of the Seychelles, as is well known, practically depends on vanilla, the exports of which to Great Britain in 1899 were valued at 873,728r, against 460,320r in 1898; France, 464,992r, against 271,320r in 1898. A rough estimate places the area of land under Vanilla at about 2,000 acres. Nearly all the vanilla is now cured in properly constructed drying-rooms heated with hot air. The French method of steaming the freshly picked pods has been tried, but the boiling water process is generally adopted. In 1899 fine prepared pods fetched 16r to 18r per pound (1r equal to 1s 4d). This year the price is from 14r to 16r. Green pods are now being sold at 10r per one hundred pods. The Administrator gives some hints concerning the method of planting, but similar information will be found in recent volumes of the *Chemist and Druggist*. The exports of vanilla from Mauritius in 1899 were 3,709 kilos, against 4,042 kilos in 1898, or a decrease of 303 kilos.—*Chemist and Druggist*, Nov. 24.

PROFESSOR KOCH ON MALARIA.

FINAL REPORT ON THE GERMAN EXPEDITION.

[TRANSLATED FOR THE *Pioneer* WITH HIS CONSENT.]

On the 6th of August, 1900, we left Herbertshöhe (in New Guinea) for home. The North German Lloyd's new line of steamers, plying between Sydney, New Guinea and Hongkong, and touching at the Caroline and Mariana Islands afforded us an opportunity of visiting these islands and obtaining, so far as the shortness of our stay permitted, a glimpse of their hygienic conditions. Mainly for this reason I chose this line for the voyage home, and was able to make investigations in Ponape on the 12th and 13th of August, and in Saipan on the 17th, in which I was assisted by Dr. Girschner, a medical man in the service of the Government.

In Ponape (in the Carolines) we examined 79 children, some of whom were from Colonia (the seat of the Government), the rest from six other places, some of which are pretty distant from there. In none of them did we find the swollen spleen and the malaria-parasites in the blood which are the characteristic symptoms of malaria. This proves beyond doubt that the island of Ponape is free of malaria. A case of dysentery was said to have occurred a good while ago. From what Dr. Girschner told me I judge that the skin-diseases which are so extremely frequent in the South Sea, and the disease called yaws, which is often mistaken for syphilis, play no great part in the island.

In Saipan (one of the Mariana Islands) 24 children were examined, and neither swelling of the spleen nor malaria-parasites were found; whence we may infer that this island too is free of malaria. Among the many other people who were shown to me as suffering from syphilis, lupus, and leprosy there was not a single one who really was suffering from one of these diseases. Their disease was framboesia, which the English also call yaws. It seems to be very frequent in Saipan, and is extremely widely diffused in the South Sea. I have seen places in the Bismark Archipelago, where almost all the children had it; and it is said that the children of Europeans are sometimes attacked by it too. It is often mistaken for syphilis by non-medical and also by medical men, and I am inclined to believe that the statements about the wide prevalence of syphilis in the South Sea and particularly in the German Colonies there, are due to this fact. It is highly desirable that a physician well acquainted with syphillis and diseases of the skin (a specialist, if possible) be sent to German New Guinea to make a more exact study of these diseases.

A peculiar disease was said to occur at Saipan, the course of which, with fever and lasting paralysis of certain limbs, could not but awaken the suspicion that it was beriberi. Of the patients of this kind who were shown to me one was suffering from hemiplegia, others from articular or muscular rheumatism. There was not a single indubitable case of beriberi. On the whole I got the impression that, as the islands of Ponape and Saipan are free of malaria and also of other tropical diseases except yaws, their hygienic condition is very good. From Hongkong we went by the main line of the North German Lloyd to Suez, where we broke our journey, in order to make a short stay in Egypt. The purpose of our visit to Egypt was to find some explanation of the contradictory reports about the malaria there. This purpose was partly gained, for we found in Alexandria several cases of malaria which had indubitably originated in or near that city, and genuine foci of endemic malaria at Heluan near Cairo and at Wadi Natrun, west of the Delta, in the midst of the desert. According to the last news I have received from Stephansort, dated the 8th of August, the favourable state of malaria there described in my reports had remained unaltered. In order to pave the way for the repetition in Germany of the experiment that succeeded so well in New Guinea, Professor Frosch, who was at one time a member of the malaria expedition, has visited many apparently suitable districts in North Germany, and made careful investigations with a view to ascertaining whether there is any malaria there. He found everywhere that malaria is rapidly dying out. At many places which used to be notorious malaria-foci the disease has almost entirely vanished ; at others (in the marshy lands on the North Sea coast for instance) only isolated cases occur ; nowhere could a malaria-focus suitable for my purposes be found.

Under these circumstances nothing remained but to conclude the work of the malaria expedition for the present.

Berlin, Nov. 17.—On the 15th instant Professor Robert Koch spoke to the Berlin and Charlottenburg section of the German Colonial Society on the results of the malaria expedition sent out by the German Empire. The meeting took place in the hall of the Kaiserhof (one of the biggest hotels in Berlin), and consisted largely of medical men, officials of the Colonial Department and officers of the army and navy. Koch was welcomed with loud applause. He began by thanking the Colonial Society for suggesting the malaria expeditions, and then stated what is now known about malaria. The gist of his lecture was this :

The germ of malaria, first seen by Laveran, is an animal organism, which lives in the blood of the malaria-patient and is so characteristic that the discovery of even one such parasite in a person's blood justifies the opinion that he has malaria. There is a whole group of malaria-parasites, and a corresponding group of malarial diseases. Germany has two kinds of malaria, Italy three, and a fourth kind, tropical malaria, is found in the tropics. The parasite can live long in a human body. Malaria reveals itself in a series of attacks each of which is the consequence of a fresh proliferation of germs. The violence of the attacks diminishes in the course of the disease, but relapses take place, sometimes even after the lapse of years. The question how the parasites get into the blood used to be answered in several very different ways. Now it is known that they are conveyed from one human body to another by gnats. This discovery is due to an observation of Ross, who demonstrated that the germs of malaria undergo a long process of development in the stomachs of gnats. The microscope shows that the developed germs meet in the poison-gland of the gnat. When a gnat sucks a human being's blood it empties its poison-gland, and thus introduces the parasites into his blood. In August, 1898, a German expedition was sent to Italy to test Ross's statements, and was soon able to confirm them. It was also ascertained that the apparently different Italian forms of malaria are really one, that Italian malaria is identical with tropical malaria, and that, apart from quartian and tertian which occur among ourselves there really is only one form of malaria, namely tropical malaria.

In the spring of 1899 the German expedition went to Italy again, and took up its abode at Grosset, in the Tuscan Maremmae. Spring was chosen, because it is in spring that malaria breaks out afresh in Italy. At first there were few cases, and these were relapses of cases of the year before. Not till the weather became warmer did the first fresh cases occur, but then their number increased very rapidly. They were uncommonly severe too, but the patients were taken to the hospital so promptly that the systematic treatment with quinine could begin in good time, and consequently the number of deaths was comparatively small. In autumn, after raging for four months, the malaria died out. Now, why is it that no fresh cases of malaria occur in Italy in winter, though there are gnats there in winter too? The reason is that the real home of malaria-germs is the body of a malaria-patient ; they winter there. But the human body is not only the real home of malaria-parasites, it is also their only home. In the blood of monkeys, birds, and bats, indeed, organisms strongly resembling malaria-parasites are found, but closer examination shows that they differ from them. That the malaria-parasite thrives only in the human body is also proved by the fact that malaria is not transferable to anthropomorphous apes. The way in which malaria is propagated is this : a human being with malaria-parasites is stung by a gnat, which thus imbibes malaria-germs, which then develop in it, and are introduced into the blood of another person whom it stings. The anopheles is the chief bearer of malaria-parasites, but it is probable that other kinds of gnats (the pulex for instance) play a part in the business. It follows that in the battle with malaria the point of attack must be the malaria-patient.

The expedition then went to Java, and from there to New Guinea. Notwithstanding the great resemblance between the physical and biological conditions of those two islands, they differ most strikingly. Wherever you go in Java you see the fruits of prosperous human labour ; in New Guinea hardly a trace of it. But the history of Java teaches that New Guinea too may be made to blossom like the rose. All that is necessary is the judiciously managed colonisation of the country, and the only hindrance (but it is a most formidable one)

is malaria, which sweeps away men, women, and children. One most important hint for the combating of malaria is furnished by the discovery made by the expedition in New Guinea that malaria is at bottom a children's disease. If you examine the children at a place where malaria is endemic, you find every one of them under the age of two suffering from malaria. In the older children, up to the age of ten, malaria parasites are found but not so frequently. The best way to ascertain whether a place has malaria is to examine the children. This method was employed in New Guinea and in the neighbouring islands, and it was found that there is only one point on the coast free of malaria, and that some of the islands are free, others not. The combating of malaria must begin with the children, but it is also of paramount importance to attack all mild or latent cases. The latent cases play the same part in the combating of malaria as in the combating of cholera.

That this is not mere theory was signally proved by a practical experiment made by the expedition on the plantations at Stephansort. Of the 700 inhabitants 137 were ill of malaria and all but a few isolated cases were cured. Special attention was paid to all new born and newly arrived children. Those children arrived remained in good health, whereas till then it had been impossible to keep children alive there. The experiment which succeeded there on a small scale will succeed elsewhere on a large. The great decrease of malaria in Germany is significant in this connection. The draining of the swamps alone does not account for it. Gnats, and in particular the various kinds of anopheles, are everywhere to be found. The real reason is that quinine has become accessible even to the poor. In the marshy lands of North-West Germany everybody now keeps quinine in his house, but thirty years ago a doctor had to think twice before prescribing quinine for a poor patient. The dying out of malaria in Germany is strikingly reflected in the statistics of the army. In 1869 the number of cases in the army was 13,500, in 1879 9,000, in 1889 1,500, and in 1896 only 230.

How is it with other proposals for the combating of malaria? One of them is to annihilate the gnats. Here and there perhaps this may be done by pouring petroleum into swamps, but on a great scale it is impracticable. Another proposal is to protect people against gnats by means of ethereal oils; but the effect of such oils lasts only a short time, Another means of protection is the mosquito-net; but such nets are seldom worn after sunset, and they often let mosquitoes through. The mosquito-proof house is open to similar objections. All attempts to confer immunity from malaria have hitherto failed. The prophylactic treatment with quinine, on the other hand, is of value, but it cannot be carried out generally and long.

How, then is malaria to be combated in our colonies? We must send out medical men trained to work with the microscope, and follow the example of the Dutch Colonial administration in giving the people quinine gratis. The first thing necessary is to send some medical men, especially to New Guinea and South-West Africa, as malaria-doctors. This measure, based on the new knowledge we have gained of the manner in which malaria spreads, would afford the prospect of our getting the upper hand of malaria ere long in the colonies, which is the preliminary condition of their prosperity. Professor Koach's lecture was received with loud applause and Professor Gerhardt (one of the medical luminaries of Berlin) delivered a short speech, in which he praised Koch as an investigator who not only brought new facts to light, but also taught how to turn them to practical account.—*Pioneer*, Dec. 23.

THE DATE PALM IN SOUTH ALGERIA.

I have been reading a little pamphlet in French on the cultivation of the Date Palm in South Algeria by the Agriculture and Industrial Society of South Algeria. They have been exhibiting dates, and also *Eau-de-vie* made from dates at the Paris Exhibition. As the French mode of cultivation may interest anyone in India who may be inclined to try date plantations, I give herewith a translation of their method.

The pamphlet says that when date seeds are sown they produce a preponderance of males and inferior varieties, although sometimes new varieties occur. *En passant* one might note that the trees which now produce the finest dates in the world could not have originated *except from seeds*. In Algeria they plant the offsets of the best sorts of secure the same kind of fine date trees. The nativte plant their offsets out at once, but this method gives usually only 40 to 45 per cent that strike and grow. The South Algerian Society have adopted another method, which is the following:—They plant the offsets in manured soil in pots about 15 inches in diameter and as deep. Then they plunge the pots in a nursery, where they can be easily tended and irrigated. When they root, they are lifted out of the pots with their ball of roots, and planted in the form of a plantation. While the tree are growing, they take catch-crops from between the rows, such as lucerne, barley and other low crops. Great attention is paid to the date palms by regular irrigation from artesian wells. By this method of striking the offsets, they secure from 90 to 95 per cent of rooted plants. Their best sort is called *deglet nour.* They have also what are called *dry* dates, I suppose similar to those brought down to India by Afghan traders under the name of *chohara.* The latter sorts never ripen into the transparent sweetmeaty sorts, such as those we see in the London shops. E BONAVIA, M D.

London, 28th Nov. 1900.—*Indian Gardening.*

DR. WATT'S LATEST ON TEA PESTS.

Dr. Geo. Watt, Reporter on Economic Products to the Government of India, who, with Mr. Harold H Mann, has been on a tour through the tea districts, has returned to Calcutta, and has brought away with him a very large mass of material in the shape of specimens of pests and blights which attack the tea bush, and which will require much time and labour to investigate and identify. Dr. Watt's *Pests and Blights of the Tea Plant* will have to be revised and considerably enlarged after he has worked up all the specimens he has brought away with him. It should be noted that the specimens he has now brought with him, and which are being added to almost daily by Mr. Mann (who is still touring in the tea districts) are nearly all new. During Dr. Watt's travels among the tea gardens of Assam he found himself on one estate on which a certain kind of caterpillar was devastating the entire garden. The Manager told him that he had been capturing these caterpillars at the rate of *eight* "Acme" chestsful every day. and on counting up his bag, found he had slaughtered 2,700,000 of them! Had he not done this little

bit of *shikarring* on his own account, he would, at a moderate computation, have had to contend against 90,000,000 of these pests next year, with the result that his tea bushes would have been wiped out, and would have gone to manure the land on which they stood. The caterpillar is a peculiarly destructive one, and cunning, for it builds itself a round cocoon of the size and shape of an ordinary marble, and buries it in the soil, where it remains, and comes out in due course as a moth, which in its turn lays its eggs, which hatch out into the little caterpillars. Dr. Watt has brought away a number of these marble cocoons, and is cultivating them in the soil in which he found them, and will thus be able to study their life-history. Dr. Watt also found the little brown bug, that devastated the Ceylon coffee bushes, on a jungle creeper. The bug has commenced to attack the tea bush, and we have now to learn what it will do if allowed to increased and multiply. It is as destructive to tea as it proved itself to coffee. Truly, the tea bush is proving itself a veritable host to all sorts and conditions of insect and fungoid pests; yet it flourishes and "over-production" is the watch-word of tea men just at present. There is yet another interesting discovery made by Dr. Watt. He has found that several of the scale insects are attacked by certain fungi, and killed. He thinks that in such cases the fungi should be employed to inoculate the scale insects, and thus destroy them. He is therefore making cultures of these fungi, and we may expect some nteresting results from his investigations.—*Indian Gardening and Planting*, Dec. 20.

RUBBER AND ITS PRODUCERS.

We direct attention to another interesting letter from Mr. Godefroy-Lebeuf of Paris, on this subject. Our correspondent writes wonderfully good English,—we only wish we could write French as well—and if he would only make all botanical and unusual terms very clear, the printers would rejoice in his letters. The bark we sent him from a planter, we understood to be from young "Para" trees?—but we may learn more about this. Meantime, there is a good deal of interesting information in the letter before us; and in regard to the "Sapium" we quote as follows from the "Treasury of Botany":—

Sapium.—A genus containing about a score of trees or shrubs of the order Euphorbiaceæ, found in the tropics of both hemispheres, and all of them yielding a milky juice, which in some is very acrid and even poisonous. The leaves resemble those of the willow, the poplar, or the laurel, and at their point of union with the stalk are furnished with two round glands; while the small greenish flowers are disposed in terminal spikes, the lower portion bearing the fertile, the upper the sterile flowers.

S. indicum, a widely distributed eastern species, is known under the name of Boroo, where, according to Mr. Motley, the leaves are largely used for dyeing and staining rotang of a dark colour. The acrid milky juice produces a burning sensation like that from a capsicum. The young fruit is acid and eaten as a condiment, while at the same time the fruit is one of the ingredients used for poisoning alligators. The ripe fruits are woody trilobed capsules, about an inch across, with three cells, and one oily seed in each.

The Milkwood of Jamaica, S. laurifolium, receives its name from the milky juice which abounds in the stem, and is a source of annoyance to sawyers and others when the wood is green. S. salicifolium affords in Paraguay a bark which is used instead of that of oak for tanning. Most modern authors unite this genus with Stillingia, from which there are no reliable characters to distinguish it.

If anything is to be done with "Chonemorpha" for rubber purposes, we may be sure the Director of our Botanic Gardens will see to it:—

Chonemorpha.—A genus of Apocynaceæ, closely allied to Echites, and differing from it principally in the funnel shaped corolla. The species are, moreover, Indian not American. The root and leaves of C. malabarica, a plant of Malabar, are used medicinally by the natives

FIBRE EXTRACTION.

Bahamas—The factory for extracting and preparing the fibre of the pita plant or agave sisalsna contains machinery driven by an oil or gas engine and the press for baling. The machine is placed at one of the extremities of the building with free communication to the outside, where there is a mound or raised stand from which the operator feeds the machine, a continuous thin stream of water being conducted to and flowing into the machine, so that the fibre is washed clean during the process of extraction. The leaves are carried by strong "grip" chains to large scutching wheels, which have brass knives passing across the periphery, and these knives scrape the vegetable matter from the fibre against brass or wood curves. At the other end of the machine, and inside the factory an operator is seated to receive the fibre as it emerges white and clean and from thence it is carried by other working hands to the outside, and is there hung out to dry in the sun across posts and rails erected for the purpose. When thoroughly dried, the fibre is brought back to the factory and packed in bales by means of a press exactly similar to a wool press, care being taken to turn in the ends of the fibre so as to give a smooth exterior surface to the bale when it is turned out of the press. Uniformity in weight is not attempted, they vary from 350 lb. to 500 lb. The maximum capacity of the best machine is about one ton of fibre per day. The following is a list of the machines which are or have been in general use:—*Prieto.*—A machine made in Barcelona and in use in Yucatan. *Todd.*—An American patent. Several of these machines are in use in the Bahamas; it may be consider fairly satisfactory, but not so good as the Villamor, of which patent there is one in use in the Island of New Providence. *Villamor.*—A better machine than the Todd in the amount of work done, and is not so liable to break down. It is an American machine, but is not being made at present. It has hitherto been used a great deal in Yucatan. *Torvella.*—A machine made by the same American firm that brought out the Villamor. The Torvella is now replacing the Villamor in Yucatan, and is very highly esteemed there. *Stephens or Theband.*—This is a large and expensive American machine. It is reported that a new machine is coming out on a new principle and probably cheaper.—*Colonial Office Report from the Bahamas.*

Tobacco Cultivation in Jaffna.—In some places the planting of the fragrant weed has commenced, while in others the preparing of the soil and manuring it are going on preparatory to planting. All kinds of manures have gone up considerably in value. The area which will be under tobacco cultivation this time will be much larger than it was in previous years.—*Hindu Organ*, Dec. 19.

THE SCIENTIFIC CULTURE OF TEA AND ITS CRITICS.

It is extremely like "teaching one s grandmother how to suck eggs," to find our evening contemporary attempting to instruct veteran planters and visiting agents in the rudiments of their profession! The process also of trying to discredit and repress scientific cultivation in respect of our Tea planting industry, so frequently attempted in the same columns, bears a close resemblance to Dame Partington's vain attempts to drive back the Atlantic! Cultivation according to scientific principles is acknowleged to be the only means to maintain and render permanent—rather than to injure or destroy—an agricultural industry. The existence of Rothamstead and the life-history of Sir John Lawes and Sir Henry Gilbert testify to this fact, and it is eminently satisfactory to know that Mr. Joseph Fraser has returned from his visits to Rothamstead and from interviews with the greatest agricultural authorities of the age with a clearer grasp of the principles and means to be followed; but without any conviction as to mistakes in the past, such as Mr. G. A. albot supposed he had discovered. It is abundantly evident that tea on old coffee land may as well be abandoned if it is not liberally supplied with fertilizers and nutriment; while it is quite as evident that tea on many younger estates with poor soil, must be aided judiciously and scientifically if its heart is to be maintained.

That means the use of "forcing manures" according to the ordinary but ignorant critic. "Give a dog a bad name and you may at once hang him" is the equivalent vulgar adage. But by following scientific teaching and at the same time watching the result of experiments—"science with practice" in other words—the planter can settle for himself what is best for his plantation, his tea bush and his pocket. This is exactly what has been done, for instance, on Damboolagalla and Pitakande. These estates are, we suppose, open for inspection—we write without any communication from Mr. Fraser who has a far greater stake in the permanent health and prosperity of the Ceylon Tea Industry than most of his critics, and who has verified again and again the truth of the adage that "the proof of the pudding is in the eating thereof," while he can show his tea to be in better heart and greater vigour now than when he commenced his operations.

But does all this not mean an encouragement to overproduction, and especially to the overproduction of cheap teas? We answer by enquiring who can be more interested in doing the right thing for himself, or for his employers or Directors, than the average Ceylon planter. He is by no means the shortsighted worker or downright idiot that some people would think him to be. Last year, it paid well to manufacture an abundance of tea of a cheap grade; and this year the same course being followed, a similar good return might have been experienced, were it not that Indian planters (see the editorial from a Calcutta authority we gave yesterday) abandoned their usual course and, thinking to follow the example of Ceylon, rushed at the supply of cheap teas, so that the market was entirely overdone, and the finer teas have become scarce in proportion to demand. Now, there is the risk of another swing of the pendulum; but the average Ceylon planter has a level head and he will give due consideration to the best course for him to pursue as to "plucking" and "manufacture," while keeping up cultivation and utterly ignoring the ignorant or prejudiced cry about "forcing manures." Even for returns of 450 to 600 lb. an acre, Ceylon tea requires a regular supply of fertilizers if the bushes are to be kept in heart and not worn out prematurely, and we suppose not all the critics in the world—even though led by a contemporary who knows nothing of planting and backed by Mr. G. A. Talbot—would keep the Directors and Manager of Mariawatte—to take only one instance—from following the same course of liberal cultivation which they have proved to be right, as well as successful, in giving handsome financial returns, for the past eighteen years; and we trow that in point of health and vigour, Mariawatte tea will compare with any in the island?

THE FUTURE OF TEA:

HOW TO DEAL WITH THE RISK OF OVER-PRODUCTION.

The proceedings of the Planters' Association in Kandy last month may for once be criticised by onlookers as more of academic than of practical interest. "What is the use," we may be told, "of agitating for the removal or reduction of an Imperial duty when Sir Michael Hicks-Beach has just been assuring a Deputation that there was more likelihood of it being increased rather than reduced?" Nevertheless, we consider Mr. Metcalfe (whom we congratulate on a first appearance and an able maiden speech), Mr. Westland and their supporters most amply justified in the course they have pursued. In the first place, the very best way to destroy the least chance of an increase in the tea duty is to send on Saturday's Resolution urging a reduction; and in the second place, even in the present House of Commons, we are not sure if the question of reduction were taken up on next Budget by some good speaker and leader, that the division would not show a very respectable if not considerable minority. But most important of all is it to begin an agitation now, and to continue it at intervals, if fruit is to be borne in the Budget of fifteen months hence, or in March 1902 when the impost should be reduced not to 4d, but to 3d per lb. So mote it be.

But now to turn from the speeches given elsewhere with their serious tone as to the risk of over-production and of non-paying prices, we direct attention to the deliverance of the Chairman of the Planters'

Association as to the best remedy for an admitted evil, which is contained in the letter he has addressed to us (see page 544). This letter will be read with the greatest possible interest both here and in India, It proposes a heroic measure, and Mr. Rosling deserves a high degree of credit for coming forward at this juncture with what must be regarded as a self-denying ordinance. For, we think there will be no difference of opinion as to the greater part of any loss falling on the higher districts and estates if Mr. Rosling's proposal takes effect. In many of the older and lower districts, it is not too much to say that in a number of cases, not 10 but 20 per cent of the cultivated area might well be given a rest with advantage to the purse of the proprietor; while even with the present reduced grade of prices, ten per cent less of plucking in the higher districts must mean a real loss in itself to owners. Still, there are cases where "the common good" calls for united action, and it is very commendable that the Chairman of the Association should make himself the mouthpiece of the community and come forward with a proposal to deal with an admitted evil, which is practicable and sufficient on the face of it, *if* only unanimity and a sense of honour in its support could be calculated on to prevail throughout the Tea Districts of India as well as of Ceylon. There lies the difficulty. Did the issue depend on Ceylon alone, Mr. Rosling could make quite sure at once of his 80—nay 90-per cent. But how is it possible, in view of past experience, to expect any such result in the case of India? Surely, a far simpler demand on the Indian tea garden owners was the call for subscriptions to the fund for winning new countries to the consumption of their teas. But although this has been pressed year after year in the most urgent fashion and by incontroversible arguments, have 80 per cent. of the owners been gathered in as supporters of the Fund? We trow not. We doubt if one-half, or at most 60 per cent, of the estate owners have responded; and that would lead us to fear an even less proportion of responses to the present appeal. Nevertheless, we think it only reasonable and prudent that such an appeal should be made. If the failure be as we fear, in India, it will more and more show where the blame lies of doing nothing to prevent a crisis. First, Indian proprietors have never moved as they might and ought to secure the imposition of a Tea Cess after the pattern set in Ceylon. Secondly, they have failed to subscribe voluntarily to a Fund, the utility and advantage of which have been universally admitted; and now, thirdly let us see what they have to say to Mr. Rosling's appeal? To bring it formally before the Calcutta Tea Association and the various district bodies throughout India, would it not be well for the appeal to bear the *imprimatur* (as a passed Resolution, say) of the parent Planters' Association in Ceylon. Perhaps, this is Mr. Rosling's intention and that his letter in the first instance is put forward as a "feeler," to educe the opinions of representative men among the planters?

PLANTING NOTES.

Mr. Saville-Kent's recent address at the Royal Colonial Institute in regard to Westralian Pearl Oysters and Pearl Shell and other Fisheries is given in full on another page, and makes good and interesting reading. We have a letter by this mail in regard to the Ceylon Pearl Fisheries from Mr. Stanley Gardiner, the Naturalist from Cambridge University, who has done so much work in regard to coral reefs, etc., in the South Seas, Maldives, etc. It will appear in an early issue.

Volatile Oils.—We have received with the compliments of the world-wide-known firm of Messrs. Schimmel & Co., Leipzig, a copy of a beautifully-printed, well-bound volume * on this subject. There are several maps indicating the pathways of commerce (grocery and spices especially) in ancient, middle age and modern times. There is also a map of Sicily and Calabria showing the Districts of Production of Orange, Lemon and Bergamot Essences in Southern Italy, Calabria and Sicily. There is a chapter on "the Oils of Ceylon (Cinnamon), oil of Cinnamon leaves and root" and of course the oils from grasses—citronella oil, etc.—are largely dealt with, a map of our Southern Province with the Citronella Oil Districts being given.

* The Volatile Oils, by E. Gildemeister, Leipzig, and F. R. Hoffman, Berlin, written under the auspices of the firm of Schimmel & Co., Leipzig. Authorized translation by Edward Kremers, Madison, Wis. With four maps and numerous illustrations. Milwaukee, Pharmaceutical Review Publ. Co., 1900.

The Sisal Industry in the Bahamas.—The Colonial Secretary of the Bahamas, reporting on the pita plant, or *Agave sisalana* of the Bahamas, says it is not identical with the agave, or henegnen of Yucatan, though closely allied to it. The henegnen has long been known in various West Indian islands as the dagger plant, and has been used for hedges and by the country people for making rope for domestic use. The Bahamas plant is generally unknown in the West Indies. Six years ago it was imported to St. Kitts, and was planted in the island of Anguilla, where there were large areas of waste land. It is not known when it was introduced to the Bahamas; it is certain that it is not indigenous there. It is superior to the Yucatan plant, and in the hands of Bahamas planters gives fibre of better quality and greater market value, while possessing all the powers henegnen to withstand drought, its hardihood, immense fecundity, and small demands on the labour and care of the grower. The name Sisal seems to be derived from the port in Yucatan from which henegnen was formerly exported. The Bahamas plant is of a darker green hue, and there are no thorns along the edges of the leaf, but in other respects it resembles the Yucatan variety. The most suitable land in the Bahamas is that called coppice land, which is chiefly vegetable mould deposited over soft limestone on which the plant feeds largely. After four years' growth, or less in very favourable conditions the leaves are fit for cutting. They weigh from 1 lb to 2½ lb, and are scraped by machines which take off all the vegetable matter, leaving only the fibre, which emerges white and clean and is hung out across posts and rails to dry in the sun. When thoroughly dried it is placed under pressure and packed in bales 350 lb to 500 lb in weight, and is then ready for export. The quantity of the fibre exported last year from the Bahamas amounted to 1,358,682 lb., valued at £16,942. There are about 14,400 acres under the plant, and factories for extracting the fibre are on all the small estates.—*London Times.*

REPORT ON THE RESULTS OF TECHNICAL TESTS OF THREE PLANKS SUPPLIED BY THE GOVERNMENT OF CEYLON TO THE IMPERIAL INSTITUTE.

(In continuation of the report published in the Imperial Institute Journal, Vol. VI., p. 124. *By* Herbert Stone, Esq., F.L.S., *one of the Expert Referees of the Institute*)

DEL. *Artocarpus nobilis, Thw.* A large tree belonging to the Artocarpaceæ or Nettle and Bread-fruit tribe, confined to Ceylon. There is another Indian tree bearing the vernacular name of Dél, *i.e. Bombax malabaricum*, D.C., the Cotton tree, but the anatomical structure of the wood is so different that there can be no question that our sample is Artocarpus nobilis.

The plank was in a bad condition. Decay had commenced in the heart and the sapwood was quite rotten. The heartwood, which was hardly distinguishable from the sap except by a greater depth of colour, had a beautiful metallic green colour, which shows in vertical patches where the wood is hard, but, as there are alternate strips of hard and very soft wood, the appearance is not beautiful. The pores are very striking, being large and filled with a white substance. The wood saws moderately easily, but will not plane in any direction, as the soft parts "pick up" in large furry patches with which nothing can be done. It turns a little better but only the hard parts cut smooth, and the softer ones, even after being well glass-papered, are unsatisfactory. The same may be said of it when turned in the machine. A good finish can be obtained upon small pieces free from soft wood; as the latter keeps absorbing the polish it is extremely troublesome and presents a poor appearance under the best conditions. The characteristic green colour becomes changed to yellow when polished. In Ceylon it is employed for furniture and canoe-making. Weight 39·3 lb per cubic foot.

JAK. This is the jak-fruit tree, *artocarpus integrifolia, Linn.* A large and important tree belonging to the same genus as the foregoing. It is cultivated in India generally, except in the north. The wood is used for carpentry boxes, and furniture, and is exported to Europe for cabinet work, turning and brush-backs (Gamble). It yields a yellow dye which is used to dye priests' robes. I have not heard of its use in England and presume it has not succeeded in gaining a footing in our market. If the present sample is a fair one it scarcely appears to merit a place among furniture woods, though it might have other virtues which would make it useful for building or engineering work. This wood works in almost every respect like Del, but not quite so bad. Before going into the question of its scientific name I was much struck by the similarity in the working of the two, and suspected their relationship. The colour of jakwood is brown, otherwise its structure and physical characters are very much like those of Del.

The sample plank was very sound both as regards decay and cracks. The wood, according to Watts, is of a yellow or yellowish brown colour darkening on exposure. He considers it one of the handsomest furniture woods of India, an opinion which is scarcely borne out by our specimens. Weight 38·5 lb. per cubic foot.

SATIN-WOOD. *Chloroxylon Swietenia, D.C.* A moderate sized tree of the Mahogany Family (*Meliaceæ*) growing abundantly in Central and Southern India, the Deccan, Ceylon and Coromandel. This is so well known in England that it is almost superfluous to enter into detail concerning it, unless the sample planks are more characteristic of the Ceylon-grown Satinwood than of East India Satinwood generally.

There were three planks of this species. Two were of a bright canary yellow colour with the characteristic smell of coconut when being sawn, sound and in good condition; the third, a badly shattered plank, was rich yellow in colour and had a less agreeable smell. Although there was no other evidence of decay I conclude that this latter plank was partly gone. All three planks cut up readily and well with the saw, but planed execrably, worse even than Del, the soft bands being very broad and rough. It yielded, however, to glass-paper, and smoothed fairly well. The wood turned very well indeed by hand and machine, and took an excellent polish without trouble. Compared with the Satin-woods commonly met with here, these samples are decidedly inferior to either the East India (as commonly known) or Tamil Satin-wood, having none of the beautiful mottle or fire of these, but it is very much like the West India wood. According to Watts it is very durable and stands well under water. The Peradeniya bridge of Ceylon, which has a single span of 205 feet, is made of this wood. Weight 56·5 lb. per cubic foot.

It is much to be regretted that more care was not exercised in selecting and seasoning these specimens. If an examination of a species of timber is intended to assist possible users in the choice of woods for special purposes, it is a matter of primary importance that the samples should be average specimens, sound and in good condition when felled, and treated with the utmost care possible, having regard to the peculiarities of each species. Some will stand exposure to sun or damp which may be ruinous to others, and I strongly suspect that when these various series were got together they were practically subjected to identical conditions, hence the large proportion of decayed or shaken logs. Except in the case of those which have been reported sound, the tests merely amount to a criticism of a number of individual logs which may not have the least bearing upon the timber they represent. I trust that if the agents of any of our Colonial Governments have similar tasks to perform in future they will observe this simple rule:—Let the timber be properly seasoned before it is shipped.—*Imperial Institute Journal.*

PLANTING IN NYSSALAND.

(By Mr. Henry Brown.)

DIFFERENT PRODUCTS.

There are several products well suited for cultivation in B. C. A., other than coffee, such as sugar, tobacco, arrowroot, ginger, turmeric, cotton, chillies, etc. These I dispose of (although they may pay very well) because the land requires to be prepared for them every time a new crop is required, and they are not permanent products.

From what I know of cacao cultivation, and judging from the appearance of the solitary plant as far as I know in existence in B. C. A. at Lauderdale estate, Mlanje, this tree is not to

succeed well in Nyasaland. The plant at Lauderdale is now about five years old, about four feet high, with a diameter of about three feet. A cacao tree in its proper climate should be from six to eight feet in height with a spread of branches about five or six feet and in partial bearing at five years of age. For cacao Nyasaland has too great extremes of cold and heat to thrive well. During the winter months the tree looks wretched and suffers much from cold and during the dry season from September to December the air appears too dry for the tree to flower freely or set any fruit.

Cinchona being a drug the market can be flooded any day, and the price reduced to a non-paying level.

Rubber.—It is long before the tree yields enough to pay and a cheap substitute is likely to be found which will reduce the price.

Vanilla and Pepper.—Although permanent occupiers of the land the consumption is limited, and they for various reasons are better suited to native gardens or small cultivators.

For the reasons given above I select tea as the most suitable product other than coffee for the consideration of planters, as it is in my opinion the best suited for European cultivation, being a permanent occupier of the land. Consumption is likely to keep pace with the production and the price cannot go below that which will yield a profit to the cultivator; otherwise the production must be reduced, when the natural consequence of higher prices would ensue as it is consumed by the masses.

The general opinion of planters whom I have met in B. C. A. is that tea requires a heavier rainfall than we have here. To dispel this idea, however, I would point out that tea has a wider range of cultivation and can be grown under more varied conditions of climate than any other product. Further, tea is grown as far north as the Caucasus in Russia and in Natal, our near neighbour in the South, and in both countries the cultivation of the plant has passed the experimental stage.

Natal where tea has been successfully grown has a similar rainfall to the drier parts of Nyasaland, viz., from 40 to 48 inches per annum. In winter the temperature is at 6 a.m. from 50 to 56 degrees Fahr. and at 11 a.m. rises to 80 and 84 degrees. In summer at sunrise 64 degrees to 70 degrees are registered and at 11 a.m. 92 to 96 degrees, which is very similar to our own climate. Some of the Indian districts where tea pays well have a very limited rainfall and badly distributed, as there are four to five months during which no rain falls at all. From official reports in the following tea districts the average for five years is as follows:—Dhubri, 70·37; Ganhabong 59·26 inches and Nowgong 77·68.

The elevation at which tea can be grown is from sea level to 5,000 and 6,000 feet. At extreme elevations a comparatively dry climate is an advantage.

A period of rest for tea such as some of the Indian districts, Natal and Nyasaland have during the cold season (three to four months), when pruning can be done, is considered beneficial.

Experience of tropical agriculture in other countries as well as here should lead one to the conviction that B.C.A., judging from its soil and climate, is more suited to be a tea than a coffee-producing country chiefly because there is a very limited area fit for coffee growing. Coffee requires either primeval forest or very rich virgin soil to prove a paying investment, with even greater advantages in cheap land and labour than we possess. . . . . Any soil in B.C.A. that would produce leaf may be reckoned good enough for tea. Tea does not suffer much from weeds and bad cultivation. I have known tea clearings abandoned for a year or more and when cleaned up the tea seemed to have grown apace with the scrub and had only to be cut down and the flushes plucked as if nothing had happened to retard its growth. Indeed I see nothing to hinder Nyasaland from taking a place amongst the tea-producing countries of the world.

PRODUCE AND PLANTING.

Shareholders and Their Grievances.—We have received a letter from an Indian subscriber of many years standing who, in calling attention to the apathy prevailing amongst shareholders in tea companies, and advocating certain reforms in the management of these concerns incidentally frames an indictment against the agency system. His charges amount to this—viz., that owing to the apathy of shareholders who fail to attend meetings, those who have the financial control of tea companies are able to do as they please. He quotes an instance in India where managing agents have charged commission upon gross expenditure, have supplied stores which were not ordered, while drawing agency salaries and directors' fees. He asks how long shareholders will be content to suffer these things. So far as the apathy of shareholders is concerned, we may remark that when joint stock companies are prosperous shareholders in them are usually indifferent about details, accepting their dividends as a matter of course and taking very little interest in the proceedings which led up to the profitable result and we fear, caring less. When times are bad they clamour for reforms, condemn the management and are generally on the rampage. Shareholders in tea companies are not exceptional in this respect as some directors can testify and they can cry out about over-capitalisation and false promises with sufficient emphasis to create an impression. There are some things in connection with the tea enterprise which certainly need reforming. If we may judge by correspondence in the Indian and Ceylon newspapers the condition of the industry demands numerous reforms, but so far we have seen few practical suggestions on the subject. Amongst such reforms should certainly be included the effacement of all managing officials who act in the manner described by our correspondent. But we presume that he does not imply that the abuse of the system in the particular instance he mentions is a good and sufficient reason for promoting an agitation against managing agents generally or endeavouring to introduce a system which would mean the risk of (to use the expression of one of Mr. Kipling's heroes) a "blooming republic" in tea. Such conduct as that referred to by our correspondent is surely quite exceptional. As a rule tea companies are managed by those responsible with unusual care, attention, and integrity. If abuses have crept into the managerial system of any particular company conducted on the joint stock system, either in London or Calcutta, the shareholders have it in their power to look into them, and they are not backward in demanding investigation, especially when dividends are not forthcoming. Shareholders in tea companies, we take it, are not specially lacking in common sense, and are as capable as any other body of shareholders of looking after their own interests. When they have quite settled amongst themselves the direction reform should take, their apathy will doubtless give way to a lively interest in the whole situation. They will then set themselves to earnestly consider the importance of those adverse factors so frequently referred to by experts, which are mainly responsible for glutted markets and the inevitable depression which ensues,

THE LATEST TEA ROLLER.

TRIAL OF PERMAN'S EXPRESS.

There was quite a large muster of gentlemen interested in the tea industry, who were courteously invited at noon on Saturday by Messrs. McLeod and Company to witness a public trial at Messrs. Jessop & Company's Works in Clive Street of Perman's "Express" roller. Among those present were Mr. Ormiston, of Messrs. Balmer Laurie & Co.; Mr. Macdonald, of Messrs. Duncan Brothers & Co.; Mr. Walker, Mr. Milne and Mr. Horne, of Messrs. Finlay, Muir & Co.; Mr. Danby, of the Planters' Stores; Mr. Kingsley, of Messrs. Shaw Wallace & Co.; Mr. Traill of Messrs. Octavius Steel & Co.; Mr. G F Playfair and Mr. F H E Lamb, of Messrs. Barry & Co,; Mr. Hall, of the South Sylhet Tea Co.; Mr. G Jamieson, Mr. Staples, of the Carron Tea Estate, and numerous other planters. Perman's "Express" roller claims to be the latest and most improved addition to tea machinery. The special advantages claimed for it are that it is simple in construction and easy to work efficiently, rolls 300 lb. of leaf in twenty to thirty minutes, occupies small space in the factory, and requires little driving power and attendance. Perman's "Express" roller has been designed by a well-known Assam Planter Engineer, and it is justly claimed by the Inventor, after series of exhaustive trials, to be the only machine on the market, which combines rapidity of work, a perfect roll and a moderate cost. The whole construction is extremely simple, merely consisting of a stationary table, to which is bolted a circular leaf box, the bottom of the latter is a revolving disc, and at right angles to same there is a fluted cone. The leaf on being emptied into the box from the top is immediately carried round by the revolving disc, the cone in the centre which, turning in an opposite direction, causes the leaf to climb the middle and side of the box and to fall again to the bottom, keeping up a continual ebullition, by which means the leaf is thoroughly aerated and heating effectually avoided. No pressure cap is required, as the weight of the leaf naturally causes it to fall to the bottom of the box. where the diameter of the fluted cone is greatest, and thereby gives the necessary twist and pressure effectually breaking the cells of the leaf, the most important function in rolling. The "Express" does not "ball" the leaf, consequently the above object is attained completely, The time occupied in rolling is from 20 to 30 minutes, thereby enabling one roll extra to be completed within the hour. The leaf is readily discharged from the door on the side of the leaf box. The roller has been inspected by Planters of repute, and in all cases resu'ts proved most satisfactory, the machine giving the leaf a good twist in a shorter time than is taken by other machines now on the market, costing nearly double the price of an "Express." The trial on Saturday proved eminently satisfactory, and several questions put by the gentlemen present anent the working of this new and latest machinery elicited a ready response by the inventor. Two hundred and twenty pounds of leaf were emptied into the box, and within half an hour were turned out with a pucca twist and quite cool. Considering that the leaf had to be brought from the Dooars, and that it was hardly in condition for rolling, the trial was very satisfactory indeed under the circumstances.—*Indian Daily News*, Nov. 19, 1900. [Messrs. Brown & Co. have been appointed agents for the above roller which will shortly be on view at Hatton—ED. *T.A.*]

TEA AND CACAO ESTATES COMPANY.

COOPER, COOPER & JOHNSON, LTD.

DIRECTORS.—Hector F Monro (Chairman), Hamilton A Hancock and William Johnson. Managing Director: Edward H Hancock.

REPORT OF THE DIRECTORS

to be submitted to the Ordinary Annual General Meeting to be held at 2 o'clock on Thursday, 20th December, 1901. at Winchester House, Old Broad Street :—

The Directors beg to submit to the Shareholders the Report and Balance Sheet, together with profit and loss account for the year ending 30th June, 1900, also the revised accounts to 30th June, 1899. They much regret that the results are so disappointing, but they feel confident not only that the revenue should not be taken as an index of future profits, but that the expenditure also will be very materially reduced. With regard to the estates, the crop of tea, which is about 2,450,000 lb., has exceeded the estimate of 2,322,000 lb., and is about 350,000 lb. more than that of the previous year; it has also been produced at a less cost than the estimate of 28 cents per lb. and at about ½d per lb. less than the previous year. It is anticipated that the production for the current year will be 2,550,000 lb. at a further reduced cost. Shareholders are, of course, aware that prices have been abnormally low, probably lower than they have ever ruled before, and when it is pointed out that 1d per lb. means £10,000 to the Company, it will be seen how much depends upon the expected improvement in the market. The cocoa crop was not a heavy one, and the board are advised that larger results are already assured for the current year. The same applies to coffee and other products. Fresh arrangements have been temporarily made for the management of the wholesale and retail departments, and the Board are advised and believe that, if further capital is provided to extend these businesses, substantial profits will bb released. The Directors have also re-sold to Mr. Johnson the greater part of the business purchased from Messrs, Johnson, Dodds & Co., they have closed the American business, and have sold the Irish Branch, both of which were purchased from Cooper Cooper & Co. The above changes in these departments have been made with the approval of the Committee, and they not only do away with the recurrent heavy losses, but they have also given the opportunity of effecting very considerable economies in the working. There is no doubt that Trading Charges, as well as the Establishment Charges, will be very materially reduced in the future. In September the Board and Committee asked Messrs. Jackson, Pixley & Co. to investigate the books from the inauguration of the Company; they have in consequence prepared amended accounts ror he period ending 30th June, 1899, which they think show more accurately the position of the Company on that date, the chief differences being on technical questions (whereby £9,830 3s 10d is brought forward to the debit of Profit and Loss Account instead of £2,005 4s 3d to the credit) relating to purchases of businesses acquired—which will be explained to the share-

holders at the meeting. In the arbitration with Messrs. Vanderspar, an award was given in their favour. The cost of this action appears in the accounts. The Directors are now consulting with the principal shareholders and with those interested in the Company, to devise a scheme for placing the Company's finances upon a sound basis, which must necessarily be taken in hand at once. This would have been proposed before had it been possible to have the revised accounts earlier. Mr. G L Davies has retired from the board since the last meeting. Mr. William Johnson retires in rotation and offers himself for re-election. Messrs. Jackson, Pixley & Co., who were appointed Auditors, offer themselves for election.—By order of the Board.

HECTOR F. MONRO, Chairman.

London, E.C , Dec, 10th.

PEARL SHELLS AND OYSTERS OFF WESTERN AUSTRALIA.

At the meeting of the Royal Colonial Institute where Sir Gerard Smith read a paper on "Recent Observations in Western Australia," --(at which among others Mr. R. B. Heinekey, Mr. G. B. Leechman, Sir Walter Sendall, G.C.M.G., and Sir E. Noel Walker, K.C.M.G., were present,) the following speech was delivered :—

Mr. W. SAVILLE-KENT, F.L.S., F Z.S.:—While some few years of residence and travel in the country enables me to endorse much that Colonel Sir Gerard Smith has deposed to and described in his admirable address concerning the natural and industrial wealth of Western Australia, I must honestly admit that I should find myself very much "at sea" if I were to attempt to enter into an elaborate criticism or enlargement of the facts and figures that he has so lucidly brought before us. On the other hand—if I may be pardoned the Hibernianism —I shall feel very much more on *terra firma* if I may be permitted to supplement Sir Gerard Smith's discourse with a few words concerning both the actual and unearned increment of wealth that awaits exploitation and development in the waters that intersect and lave the Western Australian coast-line. Colonel Sir Gerard Smith has incidentally, and by quotation only, mentioned pearl shell as being included among other articles of export. As a matter of fact, that marine product represents one of the most valuable assets of the colony. Even worked on the primitive lines of simply collecting it from the natural fishing-grounds, pearl shells to the value of from £60,000 to £100,000 are raised and annually shipped from the Western Australian ports. There can be but little doubt, however, that in the near future the systematic cultivation of pearl shell on lines parallel to those pursued in connection with ordinary commercial oysters will become a yet vaster and far more valuable industry. During those years in which I enjoyed the privilege of acting as Commissioner of Fisheries to the Queensland and Western Australian Governments experiments were initiated by me with the object of proving that this shell, like the ordinary oyster, was amenable to artificial cultivation. These experiments were successful, and as an outcome of them the systematic commercial cultivation of this valuable shell has already been established, but most notably in Queensland. Furthermore, at the instigation of that progressive statesman, Sir John Forrest, experiments were successfully made by me in the direction of acclimatising this valuable pearl shell considerably to the south of its natural habitat, that is, outside tropical waters. This means that very extensive areas on the Western Australian coast-line can be devoted to this industry with the advantage of its prosecutors being free from that stress and strain upon the Anglo-Saxon constitution that is almost inseparable from prolonged labour within the tropics. As an indication of the intrinsic value that would be attached to such a suggested industry, it is sufficient to mention that the cultivation of ordinary commercial oysters, as prosecuted in British waters, yields highly remunerative returns upon a capital that must be assessed at several millions sterling. These commercial oysters, having a gastronomic value only, obtain a maximum wholesale price of no more than one or two shillings per dozen—mostly much less. The Australian pearl oysters, on the other hand, while propagating as abundantly, and in ever-increasing demand for the manufacture of all articles composed of mother-of-pearl, realise in the wholesale market no less a price than from £7 to £10 per cwt., or on an average, say, thirty to forty shillings per dozen for well matured shell. It is obvious, I think, from this brief reference to the subject, that a big and prosperous future awaits the scientific development of the pearl-shell cultivation industry in Western Australian waters. Now, in the matter of ordinary oysters, Western Australia, in company with other of the Australasian Colonies, originally possessed what, with due care, would have constituted an inexhaustible stock of an oyster indistinguishable from our own world-famed British native. Over-fishing, however, with no provision of reserves for future propagation, has almost, if not altogether, exterminated that much-esteemed species. Time was when the Swan River estuary upon which Perth is built was one vast oyster-bed. The salt water, however, has retreated, leaving the oyster defunct, and high and dry in such abundance that, at the time of my last stay in Perth, some four or five years since, they were being extensively employed for the groundwork of the new roads and streets that were being so rapidly constructed. With the completion of the new harbour works at Fremantle, and the clearance of the river's mouth by extensive dredging, it is quite possible that conditions may be again made favourable for the growth of oysters in the Swan River estuary. And at all events a very favourable area for the re-establishment of extensive oyster fisheries exists in the neighbourhoods of Albany and King's Sound, where they formerly abounded. Ordinary descriptions of commercial fish teem in Western Australian waters, and I will merely draw attention here to the circumstance that a species of pilchard and other members of the herring tribe are included among them. It has been referred to as a matter of reproach by Sir Gerard Smith that both butter and cheese have still to be annually imported into Western Australia to the extent of several millions of pounds. The same reproach must be attached to the fact that, with the live fish in vast shoals on their coast-line, preserved herrings, sardines, and anchovies are likewise annually imported in increasing quantities from Europe. And this reproach applies not only to Western Australia but to all other of the Australasian Colonies. With the newly-accomplished federation of the Australian States, we may now, however, hopefully look forward to an immense impetus being given to the fisheries, agricultural, and all other industrial enterprises

throughout the Commonwealth in general and in Western Australia in particular, since the levelling of the Customs schedules, and of the high and uneven labour rates that have hitherto prevailed, cannot but exert a most beneficial influence on all the indigenous industries. I may, finally, mention that much has been done already in Western Australia towards providing attraction to the sporting and leisured classes in connection with the fresh water fisheries. The Colony possesses but few indigenous fresh water fish of any value within its southern and more thickly populated districts. Certain of the rivers, however, such as the Preston, Collie, Blackwood, and others, were recognised by me as possessing conditions that were apparently favourable for the introduction of English trout and other desirable varieties. Here, again, Sir John Forrest took the initiative by providing a suitable location for a trout hatchery on his estate at Bunbury, and the fry hatched from ova imported from Tasmania have now been distributed throughout a very considerable area, with the prospects of yielding very gratifying returns in future years. Murray cod, perch, silver eels, and other species have likewise been in a similar manner imported to, and distributed among other rivers of the Colony. These were mostly transported by myself from the Murray River in South Australia as small immature fish, special accommodation being provided for them for their thousand miles voyage from Adelaide to Albany on the Orient and Peninsular and Oriental mail-boats; and, according to the latest intelligence to hand, these fish have already established themselves and commenced to propagate. These few remarks will, I trust, conduce towards endorsing and further emphasising the conspicuous merits and advantages that are so amply possessed by Western Australia, and that have been so ably championed by Colonel Sir Gerard Smith in the lecture we have listened to with so much interest."

CHINA TEAS IN LONDON.

(From a Correspondent.)

I enclose a cutting from the Army and Navy Stores' list. Note what they say *re* China tea. Their sales are very large, and you might pass this on to 'Thirty Committee :–

"In calling attention to the following, Members are reminded that the use of of China Tea is *Strongly Recommended* by the Medical Profession, in preference to the Strong and Pungent teas now so much advertised.

PLANTING IN PERU.—A couple of Scots are busily engaged as planters in the valley beyond the Andes in Peru. which was reported on by Messrs. Arthur Sinclair, the late Alex. Ross and Mr. D. Clark, of Balangoda; and one of them sends us a brief letter given elsewhere, showing that great progress has been made and that coffee crops are satisfactory. There is plenty of good land ready to be opened up, and we are told labour is cheap; but our correspondent should tell us the cost per day in the equivalent of English money? Is the "centrado" a hundred reis and how stands exchange? Then what is charged for land and how are the taxes? Are there any forests of rubber-yielding trees near?

MARIAWATTE ESTATE, CEYLON.

THE HEAVIEST YIELDING TEA-GARDEN IN THE WORLD!

1900 A FAVOURABLE YEAR.

A YIELD OF 1,357 LB.—OR OVER 16 MAUNDS—MADE TEA PER ACRE!

We are much indebted to Mr. Salmond, Superintendent of Mariawatte, for a statement showing the yield of the estate to the end of 1900. As Mr. Salmond says, last year has been an unusually favourable one, the yield being (with the exception of 1890's) the maximum one in the record. We embody Mr. Salmond's figures with those given in our "Handbook and Directory," so as to make the return complete :—

MARIAWATTE ESTATE.

YIELD FOR THE WHOLE ESTATE.

Actual area in bearing: 458a. 1r. 17p.

Year.		Rainfall.		lb.
*1892	...	95·74	...	643 per acre.
1893	...	86·22	...	817 "
1894	...	72·00	...	750 "
1895	...	100 28	...	886 "
1896	...	115·41	...	896 "
1897	...	111·25	...	926 "
1898	...	79·90	...	738 "
1899	...	106·81	...	749 "
1900	...	114·63	...	996 "

Average for above nine years 822 lb. per acre.

(Oldest and Special field :—Yield of 101¼ acres of tea: N. B.—Plucking began in October, 1880.)

Year.		Made tea. lb.		Yield per acre. lb.
1880	..	911	..	8
1881	..	10,451	..	100
1882	..	3[illegible],207	..	300
1883	..	55,031	..	529

Statement of Yield of Mariawatte old tea from 1884 to 1900 showing average per acre:—

1884	...	109 230	...	1,078
1885	...	117 842	...	1,163
1886	...	105 925	...	1,046
1887	...	115,996	...	1,145
1888	...	106,410	...	1,050
1889	...	113,834	...	1,124
1890	...	140,144	...	1,384
1891	...	120,366	...	1,188
1892	...	119,909	...	1,184
1893	...	115,440	...	1,140
1894	...	110,448	...	1 090
1895	...	118,560	...	1,170
1896	...	113,360	...	1,119
1897	...	105,729	..	1,044
1898	...	108,423	...	1,073
1899	...	11[illegible],987	...	1,108
1900	...	137,066	...	1,357

D. M. SALMOND, Superintendent.

Mariawatte Estate,
Gampola, 3rd Jan. 1901.

[Average for 17 years from 1884 = 1,144 lb.]

It will be observed that over the whole estate of less than 458½ acres, the crop last year is the largest per acre—996 lb. made tea—ever gathered! It is in fact not only a "record" for Ceylon, but also

* Atgalla crops having been included; prior to 1892 figures are not available.

for "the world." Nowhere in India or Java, we suppose have 996 lb. (nearly 12 maunds) made tea, been harvested over so large an area as 458 acres? If we turn to the oldest field of Mariawatte, planted in 1879 and therefore in its 22nd year, we find the crop shews a large increase on the previous year, reaching the almost unprecedented figure of 1,357 lb. per acre for the 101¼ acres, against an average for 17 years of 1,144 lb. The average for nine years over the whole estate is 822 lb.

THE TEA TRADE.

IMPORT AND CONSUMPTION—CEYLON PLANTERS' ENTERPRISE.

[BY AN EXPERT CORRESPONDENT.]

INCREASE IN CEYLON YIELD.

As regards Ceylon, owing to favourable flushing weather during October and November there will be a small further increase in this year's crop. The import, it will be seen, is 9,500,000 lb. over the eleven months of last year. On the other hand, home consumption and export account for 8,500,000 lb. of this, leaving the small surplus in production over consumption of 1,000,000 lb. As I have said before, England will this year receive its maximum share of the Ceylon crops, because it is probable our colonies and foreign countries will take direct from Colombo all the increase that may be expected from newly-planted lands. For instance, according to "Ferguson's Directory," there were in 1897 350,000 acres planted, the whole of which will be in full bearing next year; and as the average Ceylon yield per acre is 425 lb. the 1901 crop will be about 148,000,000 lb. Of this our colonies and other nations will take direct 38,000,000 lb. calculated on the present rate of progress, leaving for export to England 110,000,000 lb. In 1898 the planted area was increased to 364,000 acres. The crop in 1902 will, therefore, probably be 154,000 000 lb. and the direct export to places other than England may be taken at 44,000,000 lb. Ten years ago, if any person had predicted that the export from Colombo to other countries than England would add up to 32 000,000 lb. he would have been put down as a lunatic: yet shipments to this extent will be a fact by the end of this month. It is now generally admitted that when consumers acquire the taste of Indian and Ceylon they case to appreciate the peculiar flavour of Chinese tea.

DEVELOPMENT OF FOREIGN BUSINESS.

Australians, following the example of the British, have almost ceased to use the latter, and now the Russians are beginning to try the former. This year they have taken from Colombo 8,000,000 lb. as samples. Ceylon planters have for some years past, as is well known, spent much money in trying to induce Americans to use their tea. Wearied at length with their tortoise rate of progress, they are trying to force the pace by manufacturing and shipping green tea to compete with the Japanese, and, to encourage the business, are paying substantial bounties on its manufacture. If previous experiments in the same direction did not succeed when the relative conditions of the two producing countries were equal, how can they expect to be able to undersell the Japanese now that they are handicapped with a 30 per cent. difference in the exchange, when the bounty funds come to an end? I think the tortoise pace is, as in the fable, the one to win the race. By the Board of Trade Returns it will also be seen that this country has secured 10,500,000 lb less from China this year, and has exported 6,500,000 lb. more. Home consumption has dwindled down to 12,500,000 lb. As far as we are concerned, it would be a matter of indifference if we did not get any more tea from China, but to the British planter the duration of the present deadlock is of vast importance. If it lasts a few months longer Russian dealers may have to take precautions against being left in the lurch. Where will they get what they require?—*Financial Times*, Dec. 14.

PLANT LIFE CURIOSITIES.

(ABERDEEN DIOCESAN ASSOCIATION.)

There was a very large attendance at the weekly meeting of the Diocesan Association last night the large hall of Kennaway's rooms, being crowded in every part. The lecturer was Mr Arthur Sinclair, F L S, Oults, and the subject of his lecture "Some Curiosities of Plant Life" was one on which he spoke from personal observation while travelling in Ceylon, the valley of the Amazon, etc. The chair was occupied by Bishop Douglas, who breefly introduced the lecturer. At the outset Mr Sinclair spoke of the importance of a knowledge of botany especially in these days of globe-trotting; and remarked that the ignorance of that subject which was a characteristic of Scotch children, was not found in Eastern lands. The youngest Hindoo child knows the name of every plant and flower around him; the Aberdeen child if asked the name of the commonest plant would probably say, "I dinna ken, an' I'm nae carin'!" The luxuriousness of the tropical vegetation, might to a certain extent account for that The Hindoo children were brought up in the open air, and cradled among the plants and flowers, and very soon became aware what plants and fruits were poisoned, and which were wholesome. Speaking of the effects of a want of botanical knowledge, Mr. Sinclair said tons of good food were lost by the neglect of mushrooms, caused by the inability to distinguish between the real wholesome mushrooms and the poisonous toadstool. He went on o speak of fungus, and described the coffee blight in Ceylon and the fungus on the potato, adding some general rules by which poisonous fungi might be avoided. He spoke in passing of the greenhouse plants imported from the tropics, and now familiar in our gardens and greenhouses, and described some huge tropical trees, pointing out that a very high value is placed by the Indian on the coconut palm and the plantain or banana trees. The bread-fruit tree and milk-tree were also described, and the lecturer said that a few of these trees would support families of natives, who sought no other food. The same class includes the famous upas tree, which, he said, was now proved innocent of the many baneful qualities once attributed to it. From the valley of the Amazon comes the rubber and the gutta-percha, the uses of the former steadily increasing, while without the latter, Mr. Sinclair said, ocean telegraphy would have been well-nigh impossible. To see nature in all her glory, it was necessary to go to the tropics, and especially to the western tropics, where the luxuriance was oppressive. He spoke of the dangers and diseases to which orchid hunters were subject, and extolled the merits of cinchona bark or quinine as a remedy for malaria, referring to the fact that that dread disease was now proved to be caused by the mosquito. The strange flowers of tropical lands were graphically described, and, speaking of the "Venus Fly Trap," and the "Pitcher Plant" which is also a fly trap, he mentioned the "Sun-dew," which is found in abundance in our own marshes at Scotston, Belhelvie, and which is a well-known fly-catcher. Mr. Sinclair, who enlivened his lecture with anecdotes and personal ex-

periences, was listened to with rapt attention, and at the close was warmly thanked for his most interesting lecture on the motion of the chairman, who, in the course of his remarks, spoke of the value of mushrooms as food, and said he had in vain tried to persuade the inhabitants of Orkney and Shetland to use the multitudes of mushrooms growing in their fields as a change from the monotony of their daily menu. In Russia, he said, mushrooms grew luxuriantly immediately after the melting of the snow, and were eaten with avidity by the natives. Dr. Ogilvie, in seconding the vote of thanks, spoke of the great value of the discovery that mosquitos caused malaria, and said it ought to be of special interest to Aberdonians, because Dr. Manson, who discovered it, was an Aberdonian. The lecture was illustrated by beautiful lantern slides, supplied by Mr. Sinclair.—*Aberdeen Free Press*, Dec. 18.

GAME PRESERVATION ON THE NILGIRIS.

(*From a Correspondent.*)

I referred the other day to the trout breeding experiments of the Nilgiri Game and Fish Preservation Association, but the Association's operations were not confined to these during the past year, a good deal having also been done by way of protecting and increasing game.

The local magistracy appear to have supplemented the efforts of the Association in this respect by inflicting substantial penalties when cases of illegal shooting were prosecuted. For instance, a fine of R50 was levied for a flagrant violation of the rule against trespass in a reserve, and R30 in the case of shooting a doe ibex. Illegal fishing was let off with moderate punishment, never in any case exceeding a fine of R10. The Association attribute success in carrying so many cases to conviction to the appointment of two competent game watchers at the foot of the Nilgiris, but they acknowledge, at the same time, that a great deal remains to be done on the plateau to stop poaching among some of the bill tribes, more especially the Bodagus and Kurumbas who inhabit remote and unfrequented parts of the district.

The destruction of vermin, as a means of game protection, has not been neglected. Jungle cats, mongooses, and wild dogs are great enemies of game and play much havoc among them. Sportsmen will therefore, be glad to learn that no less than 279 cats, 65 mongooses and 13 dogs were accounted for during the twelve months ending on June 30th last. The Game Association have a difficulty to contend with, when they give good rewards for vermin destroyed, as these rewards tempt persons to go outside the limits of the Association's jurisdiction, kill the animals where they have no value, and bring them to the office of the Association and claim the reward. During the year under notice, this difficulty was still experienced, but it is hoped surmounted by the *bona fides* of each applicant for a reward being examined before it was paid. Eagles, which destroyed large amount of feathered game, and others which catch and devour imported fish, when they can get them—were also disposed of in numbers.

A very useful record, which the Association have been labouring to set on foot for some considerable time past, was started during the year. This is the Nilgiri Game Bag, to which the local taxidermist is almost exclusively the contributor on the present occasion. Mr. Van Ingen supplied what licensees were backward in communicating, and informed the Association that 11 sambur were killed, seven on the Kundahs and two on the slopes, which proved to be the largest, the spread of their horns measuring 34 inches each. The biggest Kundah sambur measured an inch less. One spotted deer fell to the gun of a sportsman on the Westbury Estate, which lies on the northern slopes of the Nilgiris overlooking the Mysore plateau, two black bucks were also shot in the unfrequented forests conserved between the Nilgiris and the highlands in the north of the Coimbatore district. Among dangerous carnivora Mr. Van Ingen states that three tigers, two males and a female, and four panthers, all males, had been killed, five bears, all males, were also shot. The two male tigers measured 9 feet each from tip of tail to nose while the female was only three inches shorter. The largest panther was killed in the Westbury Estate, while the biggest bear was met with in Wynaad. Although hyænas are known to abound on the Nilgiris only one was destroyed and that a male at Kotagiri.

With the very limited resources at the disposal of the Association, falling short annually of R3,000, it is very satisfactory to find that more than a third of that sum was spent in rewards for vermin killed, and as much as half the rest was laid out in experiments with imported fish.

It cannot be denied that the measures of protection already adopted by the Game Association have had a most beneficial effect in preserving game, and that the future visitor to the Sanitarium may look upon good sport as certain, if he will only seek for it in likely places, when he goes to the Hills for a holiday.—*Pioneer*, Jan. 3.

CARBIDE OF CALCIUM AND ACETYLENE GAS.

A gentleman, who seems to be well up in the subject, writes to us by last mail from home:—

"I am amazed to see Carbide of Calcium pronounced by His Excellency the Governor in Executive Council to be a dangerous article on account of its being *explosive*, and therefore classed with dynamite and gunpowder! It is an article of domestic and everyday use here, and is destined within a short time to revolutionise the lighting of towns, houses, factories, etc., etc. The Germans are making rapid strides with it, see British Consular Report from Stuttgart. I fancy your Executive will hear more on this subject before long.

"*Re* Acetylene Gas from Carbide of Calcium, see the lectures by Prof. Lewis at the Society of Arts. This article should be brought very prominently to the notice of the Ceylon public as being of great utility, as soon as the mischievous notions of the Executive of this *highly dangerous explosive*(!) have been dispelled."

Acetylene gas we see very highly praised for isolated installations, such as Railway stations, and the like. Should not Mr. Pearce give it a trial?

From *Indian Engineering*, Dec. 29, we quote as follows:—

Carbide of Calcium is now being retailed in India at the rate of four annas the pound, or about half the price it can be bought at in this country. Inasmuch as India at present produces no carbide, it would be interesting to know where this supply comes from. The English Company cannot be suspected of any rash enterprise in that direction since it takes all its time to attend to its own British customers. But the field in India for acetylene lighting is such an immense one that it may possibly have occurred to some German producers of the chemical to attempt its cultivation and to spread acetylene lighting by delivering quantities of carbide upon the market at a price that would offer what are naturally a very conservative class of buyers some inducement to experiment with it,

RUBBER IN BRAZIL.

Remarking upon the steady increase in recen, years in the production of india-rubber in Brazil *La Gazette Commerciale* casts strong doubt upon the need for any further increase for a long time to come. The total quantity exported in the year ended June 30th, 1897, was, says *La Gazette Commerciale*, 22,216 metric tons of 2,205 lb. each; in 1897-8 it was 23,439 tons, in 1898 9 24,000 tons, and in the ten months ended April 30th last 23,439 tons. Probably, therefore, the exports for the whole of 1899-1900 will reach 26,000 tons at least, and they may substantially exceed this amount. Any further increase of moment is, however, very doubtful. No doubt the forests from which the gum is derived are still of vast extent, and on the score of available supply it is admitted that there is no calculable limit to the production of india-rubber in Brazil. The practice of exhausting and destroying the trees which prevails is not, therefore, for the present likely to have any effect upon the supply. But it is to be hoped, having regard to the future, that steps will be taken, even in Brazil, to provide for replanting. The important consideration in so far as the immediately prospective production is concerned, lies in the limited quantity of labour available for gathering the gum. Trained labourers are very scarce owing to the unhealthiness of the forests and the difficulty of the work, which puts a limit to the number of natives willing to undertake it. As for European immigrants, they are not to be looked for, because they are even less capable than are the natives of sustaining the fatigue and the risk of malarial disease incident to the climate.—*India-rubber and Gutta percha Trades' Journal*, Dec. 10.

RUBBER.

The German consul in Payta Piara (Peru) reports the discovery of large rubber forests on the Niera river, a branch of the Amazon, which can be reached from the middle of the tobacco plantations by eight days' journey. Several German firms organzed a large expedition to start for the interior and to secure the right to collect the rubber. As the natives are very poor, it is expected that cheap native labour will facilitate the collection. A special road is projected, which will touch Iquitos, by way of which town it is considered best to send all material, as it would be difficult to find a route which is shorter through the Piara district.—*N. Y. Journal of Commerce*, Oct. 18.

COFFEE CULTURE ON THE CLARENCE, N. S. WALES.

Mr. John Ball of Chatsworth Island, reports that his coffee crop this year is a great success. His last crop returned 1,694 pounds, which sold at 1s to 1s 3d per pound. This year the crop is expected to amount to something like 6,000 lb. Mr Ball has mastered the manufacture of coffee of the highest quality, and finds a good demand for it. His trouble is to secure sufficient quantities of beans. In reply to inquiries made of Mr Holmes, a planter in Fiji, Mr Ball has been informed that, owing to unsatisfactory price offering in Sydney for the Fijian bean, the growers there were abandoning coffee-growing, Mr Holmes forwarded Mr Ball some seeds of the Liberia coffee, which is a sturdy-growing tree with deep tap root, and which bears a larger berry than the ordinary Arabian variety. In Fiji, even at the extremely low prices (3d to 5d per pound) paid for the beans, this variety returned 4s 7d per tree. Mr Ball finds that he can pay ten pence a pound for good beans. His harvesting is done by lads who are table to earn 15s a week at the work.—*Agricultural Gazette* of New South Wales, Dec. 1900.

BRAZIL COFFEE NOTES.

The Municipality of Cravinhos is small, but it is very fertile and favourable for coffee production. It posseses eight millions of trees under production, and three millions of young plants, and has produced an average of 151 arrobas (4,880·32 pounds) per thousand trees. This is equivalent to 4 88 pounds per tree, which is considerably above any average we have thus far seen.—*Rio News*, Nov. 27.

PLANTING NOTES.

COCONUT OIL SCARCE AND HIGHER—is the heading of an article in the latest "New York Oil Reporter":—

The soap trade has been quite active this fall. The consumption of coconut oil has been steady offerings have been light and short interests have been called upon to cover. The market from these very natural causes has reached a most interesting stage. It is so bare on spot as to cause considerable anxiety on the part of consumers and to those importers unfortunate enough to be on the short side. A fair estimate of available Ceylon oil at the time of writing places the stock at but fifteen tons. There is considerably more Cochin, probably one hundred and twenty-five tons, but this is barely sufficient to keep a fair parity of price between the two grades.

BOLIVIA is a country of vast latent resources, possessing even at the present time a very considerable trade. Its products, exported through Chilian, Peruvian, Brazilian, or Argentine ports, are generally credited to one or other of those States; as a silver-producing country it ranks third as a tin producer second; its output of indiarubber—a comparatively new industry—was valued in 1898 at £1,300,000; it possesses valuable copper mines and borax deposits, while the gold mines of Tipuani are probably not inferior in richness to those of Klondike. As a consequence its import trade is by no means insignificant, but, under existing conditions, it has a tendency to drift into the hands of our German competitors, who are more alive to its importance, and who leave no stone unturned to extend their influence and their mercantile operations. —London *Times*, Dec. 19.

INFERIOR SEEDS—A strong light has been thrown on the preparations now being made by unscrupulous merchants in Germany and America for supplying the simple-minded peasants of South Africa "with shiploads of the veriest rubbish imaginable" as soon as the war is over. A contemporary says:—"Articles of such vital importance as grain for sowing and vegetable and other seeds have been manipulated by the German adulterant in a shameful manner. Husks, dirt-sweepings, weed seeds, and every conceivable kind of refuse have been done up into packets with a sprinkling of the genuine seed, packed in covers printed in the English language, and labelled in a cruelly sarcastic manner, 'Specially selected for South African cultivation.' Fertilisers, composed principally of coal dust; ready made clothes, rotten with dye; hunting knives made of scrap iron; gilt clocks, warranted; German concertinas with paper bellows, are a few of the other articles which are to flood our newly-acquired territory as opportunity may offer.—*Commercial Intelligence*.

Correspondence.

To the Editor.

THE CEYLON PEARL FISHERIES AND THEIR RESTORATION.

The Elms, Croydon, Surrey, England, Dec 6.

DEAR SIR,—I am, presumably, indebted to you for the copy of the *Ceylon Observer* of October 29th, containing a very interesting and important leading article on the subject of the Ceylon Pearl Fisheries, and in which you have been pleased to make sundry references to my work and experiences connected with cognate industries. I anticipate that it was your desire in forwarding me this copy to elicit my opinion regarding the prospects of resuscitating the depleted fisheries of the indigenous pearl-producing shell *meleagrina fucata*.

I have much pleasure in stating that I consider that it would be perfectly feasible to establish, as you have suggested, fisheries of the larger and more valuable Australian mother-of-pearl shell, *meleagrina margaretifera*, in Cingalese waters. Respecting the resuscitation of those of the indigenous species, I should feel scarcely justified in pronouncing a decided opinion without having a personal acquaintance with the conditions and environments under which that pearl-shell grows upon your coasts. At the same time the species is so closely allied to one of the smaller Australian varieties, *M. imbricata*, with which I have successfully dealt in the matter of re-establishing depleted fisheries, that I should anticipate no very serious obstacles in the accomplishment of the task.

It would afford me the greatest pleasure to contribute some practical assistance towards the restoration of your fisheries and I greatly regret I was not made aware earlier of the existing position of affairs. I gather from your leading article that negotiations are in progress if not completed for securing the assistance of Dr. Herdman of Liverpool to investigate and report as to the best plans to pursue. As indicated in your leader Dr. Herdman, should he come, will approach the subject as an entirely new one and will be dependent, for preliminary information concerning it, on the recorded experiences of the very few previous workers in this field and notably my own. In consequence, moreover, of Dr. Herdman's important University engagements he will be unable to devote more than a limited time to his investigations and it will necessarily have to be left to others to carry out the most desirable subsequent operations that may be decided on.

It has occurred to me that under such circumstances the Ceylon Government might like to avail itself of the opportunity of my assistance and practical experience towards the realisation of the objects in view. In anticipation of such a contingency I have addressed a communication to Sir West Ridgeway stating that I should be pleased to place my services at the Government's disposal and have at the same time remitted to His Excellency copies of my reports made to the various Australian Colonial Governments and other pamphlets testifying to my practical acquaintance with the subjects of Pearl and Pearl-shell Fisheries. I have also referred more particularly to my two published volumes, "The Great Barrier Reef of Australia" and "The Naturalist in Australia," in each of which I have included a chapter specially devoted to these important subjects. These volumes being too ponderous to transmit by post I have suggested that they will be found in the Colombo Public Library or in that associated with the Museum.

In the event of my services being engaged, I may add that my familiarity with the Australasian Pearl-shell grounds and past relationship with the several Australian Governments would prove of material assistance towards obtaining supplies of the larger and more valuable Australian shell for the establishment of fisheries of the species in Ceylon waters. I may remark finally that my previous inurement to, and predilection for, a tropical climate should serve me in good stead and greatly facilitate the execution of the work that may by confided to me.

I have no doubt, in conclusion, that the communication and documents I have addressed to Sir West Ridgeway will come under general notice, and if in addition there are any points in this letter that you may like to, and think desirable to, make use of, you are welcome to do so.

Thanking you again for the copy of your paper and its interesting and important contents, I remain, Yours very faithfully,

W SAVILLE-KENT, F.L.S, F.Z.S.

Late Commissioner of Fisheries, Tasmania, Victoria, Queensland, and Western Australia.

P.S.—Since writing the foregoing letter, I have made the discovery, that in addition to your leading article, your paper contains a full account of the meeting of the Royal Asiatic Society, at which this most important question of the Pearl Fisheries was discussed. His Excellency's speech clearly sets forth that no definite arrangements had been arrived at with Prof. Ray Lankester or Dr. Herdman, Prof. Ray Lankester, in fact, having, as H E. put it, "opened his mouth too wide." The chances of my being permitted the opportunity of coming to your assistance are consequently increased, and I have deemed it worth while to cable out a few words to you intimating that I am at liberty and prepared to take up the work. A year or so ago when my great friend, Sir William Flower, was at the head of the Natural History Museum (to which I was originally attached) the matter would have been referred to him and he would, I think, have indicated myself as the one man possessing the practical knowledge and acquaintance with the subject of Pearl-shell cultivation that could most naturally assist you at the present juncture. Unfortunately, both he and Prof. Huxley—my original teacher and scientific sponsor who sent me out to Australia—have passed away and those new to power are either Pharaohs that "knew not Joseph" or have other views. I am enclosing you in separate packet a few duplicate and additional reprints of my reports and papers that have turned up since I despatched my batch to Sir West Ridgeway. One of these—"The Oysters and Oyster Fisheries of Queensland"—is rather scarce and in demand. Please have it placed with the others. It would no doubt be welcome, after service, at the museum Library.

Though to some extent lost sight of during the past two years, I have been by no means idle. The fascinations of the newly-developed science of Natural Colour Photography and its application to Natural History subjects, has "commandeered" much of my time with grati-

fying results and I shall hope to make some important scientific use of the process it afforded the opportunity of its practical utilisation amid tropical surroundings. I have also in hand a scientific description or revision of the many species of commercial pearl and mother-of-pearl shells, concerning the correct identification and nomenclature of which there is almost inextricable confusion even in the most widely-accepted text-books and well-appointed museums. Another circumstance, however, has more particularly tied my hands and compelled me, like Brer Fox, to lay low this past couple of years. A syndicate of would-be company promoters approached me with the object of obtaining large concessions of suitable pearl shell cultivating areas on the Western Australian coast line, and of which they wished me to undertake the scientific direction. I went to the trouble of using my influence with the W. A. Government to get a special Act passed (which did not exist) and have paid several hundred pounds out of pocket in securing the requisite leases, etc., and now after letting the matter drag on for all this time, they have failed to raise the capital which they said they could command, and left me with all the time and trouble wasted in addition to the cash.

RUBBER:—PRODUCERS AND NEW SOURCES.

Paris, Dec. 7.

DEAR SIR,—I am very obliged to you, because you open so liberally your columns to my bad English and my worse writing. I am nearly sure that all—readers, collaborators, printers, etc.—obliged by duty to make the light shine through my prose will, in a better life, receive superior encouragement!

I send you one fruit of Castilloa Tunu * and you will see that all the seeds are sunk in the support. In Castilloa elastica the seeds are exerted. I do not know if you understand well what I write! I will ask for a botanical analysis to M. Posijor from museums and send to you.

With same post I send you a little part of a young stem of Chonemorpha Macrophylla which is an Indian plant. If you look at one end of this you will find a little part of rubber and very fine rubber! Certainly, it is not much, but the stem is a very little part of the plant and the plant is a very robust one. Why don't you pay any attention to so good a producer of rubber? In many plants rubber is found between the bark and the wood, or more properly in the inner part of the bark. In Chonemorpha the rubber is found in the marrow.

New sources of rubber are discovered every day. I have just received from a friend two tons of a rubber from one particular species of Sapium from Ecuador. I know that the plant is similar to Sapium biglandulosum var. Solimanæ, but I have heard such fantastic reports of that last plant that I cannot believe it is the same.

Consul Patin, the introductor of Sapium Solimanæ, says that that tree gives up to 40 English pounds of rubber every year!!! Mine from Ecuador gives four to six pounds and the tree must be felled (cut down). The sap begins to flow, only two or three days after. My friend has collected this year 13 tons of rubber in the country; but the trees are so abundant that nobody can say when the rubber has been taken. In the main country lives the black rubber, Castilloa species. I do not know exactly the name. The rubber badly prepared does not reach so good a price as Sapium rubber or white rubber; but gives regularly by tapping.

* Not yet received.—ED, *T.A.*

About tapping (*saignée*) my friend told me a thing that I have heard from others. The tapping must be made quickly, several cuts at once, for after four or five cuts made in the tree, the sap does not flow, the tree retains its sap!

Sapium biglandulosum is a very common plant on all the American continent; you can find it from Mexico to the Argentine Republic; but the form varies considerably; therefore the two plants which have motived the name *biglandulosum* are more or less apparent. In some parts as in Ecuador, Columbia and Peru, the rubber is good; in other parts it is considered to be very bad. The good rubber plant is always found at 2,000 feet high. I wait for enough from cooler countries.

Did you hear of rubber made from sage bush from Mexico? This plant is extremely common in all the dry region of San Luiz Potosi, and an American Company has started a manufacture. It is a small ligneous plant, two feet high. The rubber is obtained by a very curious process. The plant is boiled with soda? But I will be soon in a situation to give you particular information about the botanical name and the process.

The bark I received from you does not contain any rubber: kindly tell this to your correspondent. I have always been unsuccessful with Euphhorbeaceous plants, but you will see by the different sorts of barks I send you by this mail how rich are the barks of Mascarenhosia, Landolphia and Hancornia. Break the parts and you will see the rubber very apparent.—Believe me, Sir, your most truly servant,

A. GODEFROY-LEBEUF.

"FOXINESS" IN COFFEE.

Fairlands, Sidapur, Coorg, Dec. 29th, 1900.

DEAR SIR,—Can you inform me of any publication dealing with the foxiness in coffee, and would you kindly insert the following in an early issue of your valuable journal, and send me a copy and also further copies by V. P. P. should any answers appear.

Can you, or any of the numerous readers of your valuable journal, give me any information regarding the cause, prevention, or cure of "foxiness" in coffee.—I am, dear sir, yours faithfully,

PERCY G TIPPING.

[We can find no reference to "foxiness": does it not mean a deficiency in the beans, due to drought, poor soil, or some such cause?—ED. *T.A.*]

REH AND IRRIGATED LANDS.

30th Dec.

DEAR SIR,—With reference to an article of yours on irrigation, I believe you have taken too serious a view of the matter, regarding which I have reason to think that you are mistaken in supposing that the condition referred to is due to exhaustion of the soil. For instance, I have seen lands that have been under cultivation for ten and twelve years giving good crops as a result

of irrigation; while in the case of other lands that have developed, irrigation, after three or four crops, was discontinued. As I mentioned in my previous letter, it is the position of the channel and the soil that it runs through, that has great influence in producing this condition. I believe I can accurately say whether, after a channel has been cut, the land below it would be affected or not. Besides, irrigation is not necessary for the production of *reh*, as I will point out. There are many sheets of water in this district called "wilas" and "kalapus" and in every case the banks of these sheets of water have *reh*. I shall send you by next post the *only* plant that grows on lands affected, and which the Sinhalese call "Lunu-palá" or salt herb. The leaves are made into a curry, but they have to be well boiled and the juice expressed or it would be too saltish for the palate. I have eaten the boiled article and even then found much salt in it. This plant also grows on the edges of salt pans, and, I believe, nowhere else. It would be beneficial indeed to the goiyas of this district if Mr. Elliott had a few of his numerous acres affected by *reh*, as in that case, you may be sure he will not be long in consulting a scientist and finding out its cause and cure.—Yours faithfully, A. D.

THE TEA PLANTING INDUSTRY AND OVERPRODUCTION: SUGGESTION TO GIVE A TWO YEARS' REST TO 10 PER CENT. OF THE PLANTED ACREAGE.

Dear Sir,—It is generally admitted that the present position of the Tea Planting Industry is, owing to overproduction, very unsatisfactory; and unless some action is taken to curtail supplies, we must see the painful and prolonged process, "The survival of the fittest," gradually force some of the poorer properties out of cultivation.

This process must necessarily be a prolonged one as there are many estates which can just pay their way and which will continue to produce so long as there is no actual loss.

It has been suggested by certain gentlemen, amongst others Mr. A. Thomson, of Messrrs. Whittall & Co., that, in view of the enormous quantities of tea being produced, we should endeavour to from a combination by which the requirements of the various markets may be met, without making any one of them the dumping ground for our surplus crops.

It is necessary that any steps taken by Ceylon should receive the full support of India otherwise curtailment of shipments from here would merely allow of increased exports from Calcutta.

The three possible methods suggested for reducing our crops are :—

(1) Finer plucking which would tend to reduce the output whilst giving a better quality of tea.

(2) Making a certain percentage into green teas.

(3) Resting a certain percentage of the acreage in bearing.

The objection to No. 1 is that we should probably have too much fine tea produced with a corresponding fall in its value; and directly the better and poorer classes of tea approximated in value, there would be a tendency to pluck coarse again.

The objcetions to No. 2 are (*a*) the green tea market is not as yet sufficiently developed to afford material relief, and (*b*) the difficulty of making both black and green teas in the same factory.

The advantages of No. 3 are that if you do not pluck a field for a certain number of months, you rest your bushes and you can hardly bring them into plucking again without pruning, thus doing away to a certain extent with a possible temptation to break out of the combination. The net result would be a reduced yield and improved bushes.

I propose that all estate proprietors or their agents in Ceylon and india be asked to rest 10 per cent of their acreage in bearing for two years from the 1st April, 1901, to 31st March, 1903. This arrangement to be subject *to at least* 80 per cent of the acreage in both countries, agreeing to it in writing.

An arrangement such as this should ensure a reduction of from 15 to 20 million lb. and I feel convinced that with this quantity taken off the market the rise in price would more than compensate for the amount of leaf lost.

At the end of two years the green tea market should be largely developed, and in the black tea market consumption may have once more overtaken production.—Yours faithfully,

EDWARD ROSLING.

TEA OVER-PRODUCTION:

RE MR. E. ROSLING'S LETTER OF THE 29TH DECEMBER

Sir,—The success of Mr. Rosling's proposition to curtail supply is entirely dependent upon the "full support of India." A very large order!

Few Ceylon men nowadays belong to "the fugitive, flying community" and members, as we all are of one central, integral Planters' Association, and resident in a small island, it is perhaps a little hard for some of us to understand the extreme difficulties of united action among tea proprietors in India. The vast distances, extending from the extreme north of one Indian Presidency to the south of another, separating even one tea district from another; and the varying conditions and capacities of each district, have only to be realised to be appreciated. The apparent supine lack of combination amongst Indian Tea Planters, in such matters as voluntary assessment, exploitation of new markets, &c., must, in my mind, be attribusable to geographical disability. It would be hard to comprehend that a body of British colonists could otherwise be satisfied with so suicidal a policy as that of inaction during the past and the present. What Indian men have failed to accomplish for themselves, would, I imagine, be an *ultra vires* task for Ceylon, On the above premises, the success of an appeal from Ceylon to disunited India, would, I fear, be very dubious. Combination with India is in my opinion chimerical.

The present "very unsatisfactory" condition of the tea industry, *taken as a whole*, demands however that any agitation, the

larger it is supported the better, that will convince British tea-growers of the necessity for concerted action, for the common good, is most desirable.

Such an agitation would also sustain our right to relief, in reduction of the Home Tea Duty, and in Ceylon, of surplus revenues *i.e.* of railway rates, of upkeep of grant-in-aid roads, &c., &c.

Were finer plucking generally adopted, the higher cost of production, consequent on a lower yield, would partly equalize the possible extra profit per acre. Supposing, however, a glut of fine teas on our markets, prices for such would certainly come toppling down and further minimise such looked-for profit. Nonconforming members to a general scheme would then score heavily by supplying the demand for common teas.

High estates should now at least, with advantage to themselves, be able to adopt a policy of finer plucking. Medium to low estates, where teas with any special point cannot be turned out, would not, I believe, secure any much better price by plucking finer. It would be insufficient to compensate for the loss in yield and the extra cost. In other words, finer plucking, is not I think a remedy for the bulk of Ceylon.

Green tea manufacture appears to me to be the present solution to this very difficult problem. The development of the green tea market is what we should devote our energies to. I would suggest that approximate statistics be obtained and a tabulated statement be published of the green tea consumption of the world: 1, Name of country, amount of consumption. At present supplied by. 2, Standard samples, methods of manufacture of such. Prices, equivalents in sterling, &c. 3. Freights, dues, duties, &c., and any other information which would lead Ceylon and Indian men to see the possible scope that may exist for an invasion of the green tea market. This, however, would take time to accomplish. It does not afford any immediate relief.

My experience of "resting" a certain proportion of an estate would lead me to expect a subsequent *increased* yield. Supposing a 10th of our acreage were rested for twelve months, then brought into bearing, another 10th in the following year and so *ad infinitum*, the result in the third year and on would I believe be an increased yield and the last state of the colony would then be worse than the present. Estates would certainly rest their weakest tea first. Would then the reduction in supply amount to 15 or 20 million lb.? and *would* such curtailment, by India and Ceylon combined, ensure a sufficient, compensating rise in price?

But Mr. Rosling suggests, as a palliative only, an absolute rest of ten per cent of an acreage for two years, to enable us to tide over our present difficulties by curtailing supply. This is only possible, as he says, with the "full support of India." How to ensure unanimity and a sense of honour in such support is the question.

R. K. C.

II.

Hiralouvah, Haldummulla, Jan. 2.

Dear Sir,—I was very glad to see in your paper of 31st, how energetically the subject of over-production was being taken up, and that the remedy I suggested in my letter to your paper dated June 29th. "That all planters should not pluck from a certain acreage each year, say one-eighth or whatever amount would be considered best, so as to reduce export by 13 million pounds or so,"—is considered the best method of improving our position. A tenth will no doubt be better than one-eighth and I hope Mr. Rosling will be well supported in his scheme by all proprietors and agents. I should think the Indian Planters would be only too ready to join a plan, so certain to be of benefit to the majority of them, especially when we can show them that we in Ceylon are practically unanimous.

The only pity is, that it was not begun earlier.—Your faithfully, H. H. KIRBY.

III.

Dear Sir,—I am very glad to see by letters in *Observer* lately, that the Chairman Parent P. A, has taken up the suggestion I made in June last, in mine to you; only, as stated before, there must be some inducement, such as a refund of the individual estates contribution towards the tea cess, *i.e.* pay back the 10 ct. per 100 lb. or say for an estate producing 100,000 lb. tea pay the proprietor who stops plucking 10 per cent of his average in bearing, R100 per annum, which would practically cover half cost of weeding that portion of the estate resting. What would that leave our American Commissioner? Not much, I fear; but, if we raise prices by my suggestion it would pay us—if India will only join—to increase the cess so as to keep our good friend W Mck. going. Either that, or reduce his advertising bill for a couple of years and get him to push his own hobby, Ceylon Green Teas.—Yours faithfully,

SYN AR DY HUN.

P.S.—How much longer are we to keep on advertising in America in the face of an actual falling-off in the consumption of our teas there?

IV.

Jan. 3.

Dear Sir,—Mr. Rosling's letter is good, but he should, when he went in for yearly letting slide one-tenth of tea area, have gone further and written one-fourth. One-tenth will not make sufficient impression. One-fourth would at once establish a large reduction and bring the buyers to their senses. India has been too hard hit in 1900, to go in for coarse plucking again, and no increase of tea area would arise, as capitalists would know Ceylon had the one fourth of her area up her sleeve as it were, to pour in extra tea three months after pruning down their area allowed to go fallow.

The cornering crew will, of course, object to Mr. Rosling's views as their wish is to let the weak go to the wall: a most cruel and abominable course to pursue either as against India or Ceylon. Why should not

the man who made his R30 an acre be allowed to live because the man who makes R70 wishes to make it R100?

LIVE AND LET LIVE.

NO. V.

Jan. 3,

DEAR SIR,—If I was quite sure it was Over-production that was all the mischief, Rosling's proposal would appeal to me more. At any rate I hope his letter will do good.

ANOTHER V. A.

PLANTING NOTES.

THE FAUNA OF BRITISH INDIA, including Ceylon and Burma.—We have to acknowledge receipt of a copy of the volume "Arachnida," by R. I. Pocock, published under the authority of the Secretary of State for India in Council, edited by W. T. Blanford. (London: Taylor and Francis, Red Lion Court, Fleet Street; Calcutta: Thacker, Spink & Co.; Bombay: Thacker & Co., Ltd.) —It is a most useful compilation with numerous illustrations.

BANANAS AS SICK DIET IN TYPHOID CASES. —An American doctor—says the *British and Colonial Druggist*, Nov. 30th—has lately confirmed the belief, accepted in some medical quarters, in the value of the banana as a food for typhoid patients. It is now positively asserted that the banana is both safe and beneficial, the stomach practically absorbing the fruit owing to its nature. It contains only about 5 per cent of waste matter, 95 per cent possessing nutritive properties.

TEA GROWING IN BURMA.—A very interesting note concerning the tea grown by Kachins in the Myitkyina sub-division of Burma is supplied by the Deputy Commissioner to the last Report of the Department of Land Records and Agriculture, Burma. We learn that tea is grown in three hills Mangin, Watu, and Paule, in the Sinlu circle. The seeds are dried and stored in September, and after the jungle has been cleared are sown in nurseries in May. Holes are drilled about four feet from one another and two or three seeds on germinating are dropped into each hole. Germination is said to take about one month. The plantation is carefully weeded and, after a lapse of three years, in the month of April the tender leaves are plucked. The leaves are either boiled or steamed. Steaming is only practised by those who have the necessary steaming-pots, called in Burmese, *panug gyaung*. After the above process, which softens and imparts a yellow tint to the leaf, the leaves are taken out and spread on a mat for a night; next morning they are put into bamboo tubes or in baskets lined with green leaves. The above tea is known as pickled or wet tea, and is sold at R2 per 10 viss. If the tea leaves are not sufficiently softened by boiling or steaming, they are rolled by hand on a mat before being put into the basket. To make dry tea, the leaves, after being boiled or steamed, are pounded tight into a green bamboo tube. The thickness of the latter is then reduced as nicely as possible, and the tube is kept over a slow fire. Dried tea sells at R1 per four tubes, each weighing from 20 to 25 ticals. The Deputy Commissioner, Myitkyina, estimates that 300 to 400 square miles are available for tea cultivation in his district.—*Pioneer*, Dec. 1.

RUBBER ESTATES OF PARA.—Those who entertain ideas respecting the collection of raw rubber should (say the *India-Rubber and Gutta-Percha Journal*, December 24th,) study the report and the statements of the chairman of the Rubber Estates of Para, Limited, respecting the working of the company which was formed in April, 1898. During this time the company had only carried on business for about eighteen months, but had succeeded in sustaining a loss of nearly £24,000. Some of this, as the Chairman explained, should really be placed to capital account, as the business necessitated getting a number of labourers on to the estates and establishing factories, workshops, etc. The return of rubber for the past twelve months of the report amounted to 27 tons, against 11 tons 12 cwt. in 1889, more rubber having come into the possession of the company, although the number of collectors had been reduced from 250 or 300 to 170 or 180. The collectors had, of course, advances and stores to be afterwards paid for, but found that when they got into debt, they could collect their rubber and sell it elsewhere, so that the amount advanced was lost as well as the rubber, but Mr. Jacques hoped that this robbery had now been stopped; so that we cannot altogether say that india-rubber collecting is a bed of roses.

THE EUCALPYTUS: AMONG THE BERBERS OF ALGERIA: By Anthony Wilkins.—Here is a striking passage from this book according to the *Spectator*. Around Constantine the eucalyptus had been introduced about seven years back from Australia:—

"Already magnificent groves of these quaint yet graceful trees had grown up as if by magic. Last winter came the snow,—heavy and deep. It blocked the railway not once nor twice, and trains had to be dug out. It killed every gum-tree and every cactus for fifty miles round. All are bare and dead, and the groves are littered with the sawn limbs and logs of young giants, who have thus disappointed the hopes of those who have striven—not without success in less bleak provinces—to acclimatise them in a strange hemisphere. These trees come from a land which contains a British population, a good part of which is nearly four generations old, and a population which has begun to count itself by millions. Constantine was too cold for the trees of this land. How shall the French say that Algeria is too hot for them and for their children?

The French make bad colonists; that is a truth which Mr. Wilkin recognises, and he indicates readily its causes,—the limitation of progeny, and also the *nostalgie du boulevard*, that craving for the familiar social life of the café which is in every Frenchman's bones, but not a whit more strongly than in the bones of Cicero and every Roman of his day. In spite of it, Rome made an Empire by utilising other populations; and Frenchmen are, as Mr. Wilkin emphasises, excellent administrators. In Algeria they have cleaned up an Augean stable; in West Africa, as Miss Mary Kingsley testified, their work compares very favourably with ours. For the moment, and possibly for an abiding future, progress in the centres of commercial life is checked by the madness of Anti-Semitism, concerning which Mr. Wilkin is eloquent; but take the French where their work is merely in ruling a half-subdued and alien people, and they are admirable.

THE TEA CRISIS: OVER-PRODUCTION AND THE REMEDY.

From one of the most experienced Inspectors of Estates in the island, wa have the following:—

"Mr. Rosling's proposal to 'rest' ten per cent. of the bearing tea on every estate for a couple of years should be dismissed for the reason that it would be impossible to get it carried out in practice. In many instances the poorest fields on the estate would be selected for such treatment, and probably any loss of crop that might thus be sustained would be made up the better cultivation and manuring ot the balance. Others might select young tea just coming into bearing, and in both cases subsequent returns would be all the heavier. Another and very serious objection to 'resting' teas is that the further the bushes get away from pruning, the more liable they are to blight, and we should see this made the excuse for cutting down the tea before due date

"My view of things is that both here and in India it will resolve itself into a question of the 'survival of the fittest,' and rightly so too. It is not the smallest use taking any *general* steps for the purpose of bolstering up rotten concerns. The sooner they gc, the better for the enterprise though not perhaps for the individual. Philanthropy is all very well in its way, but it is not business. Why should a proprietor of a good estate sacrifice his yield because his neighbour has got hold of the dirty end of the stick and planted tea on unsuitable land? It is contrary to nature to expect him to do anything of the kind, and does away at once with all the principles of competition. If my neighbour is fortunate enough to be on the back of a winning horse in a race, would he pull up in order to give a broken-down old crock on three legs a change? Tea estates which do not pay, and cannot be made to pay, must in time drop out of cultivation; it will be a tedious process, but the sooner it *commences*, the better for those who are associated with sound concerns.

"When coffee went down in price many years ago to figures whfch made it impossible to work a number of estates to a profit, the acreage under cultivation was lessened, and production increased again with more prosperous times. So it will be with tea, and any attempt to interfere with the laws which govern supply and demand will, in my humble judgment, result in failure."

The above letter and that of Mr. Melville White, elsewhere, following up that of the Chairman, C. P. A., provide much food for thought and—action? Further correspondence and our comment on the same must be held over for the present.

PEARL OYSTERS AND PEARL FISHERIES OF CEYLON.

We direct attention to the following useful contribution to the subject of a development of our Pearl Fisheries, with remarks on pearl and pearl-shell oysters. Coming as it does from a Cambridge scientist, Mr. J. Stanley Gardiner, whose recent valuable investigations at the Maldives have aroused much interest and whose work upon the results of these will occupy a space of four or five years, we need hardly express the hope that his words will receive due notice. Mr. Gardiner commences with reference to the three species of pearl oyster fished for in the tropics. Two of these, pearl-shell oysters, have a steady market, but fetch poor prices as compared with the third, the true pearl oyster—valueless for its shell, but fished for its pearls. With regard to Ceylon Mr. Gardiner agrees with Captain Donnan as to the importance of currents and would support the plea for selection of sheltered reefs, if actual experiments are to be undertaken here; if these are found, Mr. Gardiner is of opinion that the cultivation of the pearl oyster could be successfully pursued. The conditions attaching to the formation of pearls in the oyster around the coast of Ceylon require to be somewhat more carefully considered than off Westralia, for instance; and we have little doubt that the risk of unsatisfactory results can be reduced to a minimum. Meanwhile we urge upon Government that there should be the least possible delay in securing the services of some duly qualified scientist—Professor Herdman's name was uppermost at the end of October last—to undertake the organisation of the work, in order that local experience may be availed of to the full, as Mr. Gardiner points out. This should be preceded, we are told, by one, two or three years' survey of the coastline by a competent marine zoologist. Whether by themselves or in conjunction with South Indian and Westralian experiments, we hope that the Ceylon pearl fisheries which have proved so remunerative to the Ceylon Government in the past, are not to undergo a very much more extended period of unjustifiable neglect.

PEARL OYSTERS AND PEARL FISHERIES OF CEYLON.

DEAR SIR,—A report of a meeting of the Ceylon branch of the Royal Asiatic Society held on Oct. 27., reprinted from the *Ceylon Observer*, has recently been placed in my hands. The paper of the evening was by Mr. Collett on "Pearl Oysters and Pearl Fisheries," a subject in which I in common with all marine zoologists am much interested. Indeed the economic importance of the pearl industry in the eyes of man adds a great dignity and anthropological interest to the subject, which will always preserve it from the sneers of true men of science,

In view of my work round the coasts of Ceylon, the Maldives, Australia and various island groups in the Pacific Ocean, I have been asked to send to you any comments I may have to make on the subject of general interest. So far as I am aware there are three species of pearl oysters largely fished in the tropics:—

1. The true pearl-shell oyster of Torres Straits, characterised by its large size, edge or lip of shell, colourless inside or slightly yellow.

2. The black-lipped pearl-shell oyster of almost universal distribution in the tropics; size same as the last, but differing from it as its name implies by having a markedly black edge or lip to the shell,

3. The pearl oyster of the Ceylon fishery, almost valueless for its shell, but fished for its pearls. Marketable pearls are found also in the two pearl-shell oysters. They are, however, seldom as lustrous as those of the true pearl oyster, and indeed are merely a bye-product, the shell being the chief thing.

The value of the shell varies considerably, good shell of the first or true shell species fetching about £100 per ton. This is a fairly constant price, as the demand for white buttons scarcely alters. At present the black lipped species is worth rather more, as fashion now demands a button of a mixed colour. Its average price is perhaps £80 per ton. The true pearl oyster of the Ceylon banks is worth from £2 to £5 a ton for its shell, but the market is very small. The value of the oyster banks depends on the value of the pearls obtained, and while varying with the market must always be very much greater than that of either of the shell species. This result is very largely due to the fact that the pearl oyster is a social bea-t, *i.e.* that thousands and even millions attach themselves to a single reef, while the two pearl-shell oysters are found scattered here and there, never, except formerly in a few areas of Torres Straits, in any very great quantity on any single area. It would be obvious however that the cultivation of either of the above three species would be, even if but very partially successful, extremely profitable, and from my experiences elsewhere, there would seem to be no good reason why it should not be quite successful on Ceylon reefs. I have indeed seen very many reefs round the coast of Ceylon, apparently absolutely identical in their physical conditions with reefs in the Pacific Ocean, and in the Maldive Group on which the black-lipped pearl shell abounds. Many quite protected shoals also to the north, east and south of Ceylon, appear to me eminently suitable for the growth of the true pearl oyster.

In Ceylon I had the pleasure on several occasions of discussing the matter with Capt. Donnan. My experience agrees with his as to the immense importance of the currents of any area. Indeed, in considering the fauna of any single reef in reference to neighbouring ones, the physical conditions are the most important factors to be taken into consideration. I would suggest, then, that the first thing to be done is to have made a thorough survey for 12, 24 or even 36 months, if necessary, of the physical conditions of the reefs in the Gulf of Manaar by a competent, practical and, if possible, experienced zoologist. The life history of the oyster can then be thoroughly worked out. The effects of currents, silt, etc., will be known as also the physical conditions of the reefs. Suitable reefs in more protected situations could then be searched for round the coast of Ceylon. On these, cultivation on a large scale could be tried, and I have little doubt would be successful. Further the reefs and waters of Ceylon have immense possibilities for the cultivation of the two pearl-shell oysters. Great areas are exceptionally favourable for sponge planting, an industry, as experiments in the Adriatic have shown, not attended with any great difficulties.

Capt. Donnan has immense, long-continued and unique experience of the pearl industry of Ceylon. Should there be any intention to appoint a scientific man to the work, it should be done without delay, so that he may have the benefit of Capt. Donnan's knowledge to the very fullest extent. He should, too, be in close relation to the museum, as he would doubtless require to refer to it constantly for literature and special information as to the fauna.

I may take this opportunity to thank all, with whom I came into contact in Ceylon, for their courtesy, kindliness and sympathy.—I am, sir, yours obediently,

J. STANLEY GARDINER.

Cambridge University, Dec. 16.

RUBBER IN EAST AFRICA.

Mr. Marsden, the British Vice-Consul for the East African Protectorate, in his report on the trade of the country, again emphasises his conviction, previously expressed that there is money for the private individual and for the Government if the rubber industry in the Protectorate were more systematically worked. "Rubber," he says, "shows an advance of 40 per cent on the previous year, but is still far below what it should be and what the country is capable of producing. This is due in a large measure, to this industry being left to take care of itself, and no properly disciplined or organised effort made to assist it. In times of drought and bad harvests the natives fall back on the rubber-collecting industry to keep themselves from starvation, but in times of plenty the industry is more or less neglected, and only vines which grow in those places easiest of approach are tapped, and in many case ruined by being cut to the ground instead of tapped. It is somewhat surprising that the attention c. planters has not been previously drawn to the systematic cultivation of the rubber vines. Through out the territory the soil is sufficiently rich to grow rubber vines in perfection without artificial aid, the only requisite being water, and on the banks of the Tana and Sabaki rivers that can be obtained all the year round. With irrigation and under proper management the results should be as satisfactory as coffee growing."—*India-rubber Trades' Journal*, Nov. 26

INDIA-RUBBER PROPAGATION.

Colonel A. Bloomfield, writing to the *Pioneer* (Dec. 20) about the propagation of the India-rubber tree, remarks that the simplest method of propagation is to strike cuttings made of a leaf of the tree cut off with about an inch of the twig above and below. Every leaf will strike readily. All the piece of twig must be underground.

OUR TEA EXPORTS.—A Calcutta merchant in a private letter to the Editor of the *Tropical Agriculturist*, writes:—"I have been indebted during the past two years to your annual supplement for the figures giving the Monthly Exports of Tea to Great Britain and elsewhere. These cannot, however, be tabulated during the course of the year owing to the way in which the export statistics are published *viz*: to week ends instead of for the calendar month. I feel sure that, were the export statistics published in some such form as annexed, they would be of added interest and value to many who like myself try to follow the development of our Indian and Ceylon Tea Trade; and I tr[illegible] it may be possible for you to give them [illegible] the suggested form."—We referred this letter to a member of the Chamber's Committee and we are glad to learn that it has been agreed to adopt the suggestion for the present year.

RUBBER ESTATES OF PARA.

STRANGE EXPERIENCES.

The ordinary general meeting of the Rubber Estates of Para, Limited, was held on the 17th inst., at Winchester House, London, E.C, the Hon. John de Grey, the chairman of the company, presided. In moving the adoption of the report, which included complete accounts from the inception of the company down to June 30th, 1900, since the total loss, as stated in the accounts amounts to £23,769 12s 3d. This, the Chairman explained, should not be treated as a total loss, because, by the initial expenditure, they had established 170 to 180 men permanently upon the estates, so that a considerably amount of the apparent loss might be reasonably called capital invested in putting the estates in working order, and establishing rubber collectors upon them, which expense would not have to be incurred again. Turning to the result of the first season's working, the Chairman had to deplore that it was of a most unsatisfactory nature, and the board, since the last meeting of the company on June 1st, had given the matter its most earnest attention, with a view to ascertaining the cause which had led to that state of things and remedy them so far as lay in their power. The report stated that Mr. Milne, the Estates Manager, had resigned, and there was little doubt that he had tendered his resignation because he had found himself unable to cope with the difficult problems that he found in managing the estates. Mr. Jacques, the Para agent of the company, had been asked to proceed to the estates and report fully upon the situation and had been appointed general manager. The Chairman stated that Mr. Jacques had given the board entire satisfaction, and had furnished them with a most valuable report upon the property and the business, which shows he has a full grasp of the situation.

In proceeding to summarise the difficulties to be encountered, first the indebtedness of collectors; secondly, robbery by them to avoid paying their debts, and also robbery by private boats; thirdly, and most important of all—the badness of the labour system.

Mr. Jacques reported as follows:—

"Admitted on all hands to be one of the wealthiest in the district," and which, he says, worked by suitable labourers, would be worth a fabulous sum, and would give ample employment to 1,200 hands, capable of producing 100 and 150 rubber trees, where it only produces one at present. "Solve," says he, "the labour question, and the company can be made a prosperous one indeed." He says also that he considers that apart from rubber, cocoa, sugar cane, bananas and plantains, timber and wood could be cultivated with good results; indeed, that there are no tropical trees or fruits but can be readily cultivated on the estates. These are all matters to which we shall direct our attention with a view to future developments. (Hear, hear.) Turning back to the balance-sheet, under profit and loss I should like to show you what economies we have been able to effect up to the present time. You will find put down in the second part of the profit and loss account, from March 25th to June 30th, 1900—taking these two dates—the salary of the London manager, £2,200; that was at the rate of £1,200 a year, so I have put it down in my notes as salary, £1,200; at the present date that is wiped out altogether. Then secretary and rent of offices appears at the rate of £550; that has been reduced to £450. Directors' fees appear as at the rate of £1,400; that has been reduced to £550, and it will interest the shareholders to know that since the meeting of June 1st, the directors have not drawn any fees, because they wished to delay doing that until the company is in a better position. (Hear, hear.) Then salaries of estate manager, accountant and inspectors were at the rate of £1,836 (£3,367); they are now reduced to £1,500 a year. The special remuneration to Para agents, £650, comes out altogether. Then with regard to the Para agents' commission, that would come under the second item of estates trading account, consumable and general stores, and we estimate that to have been about £2,000 a year; against that we have by our own Para establishment, under Mr. Jacques, a total expenditure which, including office and clerk, comes to £1,000.

REDUCTION IN ESTATES MANAGEMENT.

Then there is that very heavy item of estates management, £11,478 for eighteen months. Now, that would be at the rate of £7,600 a year, and we estimate—I cannot give you this figure exactly, but we know that great reductions have been made, and as nearly as we have been able to estimate them, they amount to £4,000, against £7,600 a year. I should now like to call your attention to the returns of rubber. The total returns of the whole season, so far as we have gone, to December 19th, are 27 tons, and last year they were 21 tons, and when you come to think that the collectors at the same date last year numbered between 250 and 300, and this year they are between 170 and 180, you will see that with a much less number, the directors have got considerably more satisfactory returns. Then I should like to mention that at this time last year we had received no remittances of the moneys of the estates, but this year, either in hand or on the sea in the shape of rubber coming to us, we have a total amount of £1,200, which is sufficient to pay one year's interest on our debentures, the first half-year of which will be due in January. I should also like to read you a telegram which we received on December 15th from Mr. Jacques. He says: "Shareholders will be glad to hear that we do not give any further credit." The meaning of that is that he has been able to stop that detestable system of indebtedness which has been—I will not say the ruin, but which has militated very greatly against the success of the company. You know that according to the system which has prevailed up to the present, when you sent a man up to the estate as a collector, you were asked to equip him with stores, cash and various advances. I do not know whether it will be possible, from what has taken place, to completely change that system, but at any rate, it can be greatly modified, because our great cause of trouble up to the present time has been that collectors great advances far in excess of what they should do, and when they become so indebted, rather than liquidate their indebtedness by giving their rubber to the company to reduce it, they sell it elsewhere. Mr. Jacques is endeavouring to do away with that system altogether, and that telegram means that he is not going to make any further advances. In conclusion, I will only repeat what I said on June 1st, 1900, and which I think is borne out by what I have now stated to you. I said on that occasion:"We are not going to try and make a large profit in the first season. We do not want to run any risks. We want to confine our efforts to building up a proper system of management which shall bear fruit in the future, so that by gradually extending our operations in future seasons we may develop the undoubted resources of our property." It is our confident hope that in time we may be able to carry out that policy with success.

Questions on details of the accounts were put by Mr. Wilkinson and replied to by the Chairman, after which the motion was put and carried.

The retiring directors, the Hon. John de Grey and Mr. E. T. Wolseley, were re-elected on the motion of Count de Torre Diaz, seconded by Mr. H. M. Baker.

Messrs. F. Davies, Meredith & Co. having been reappointed auditors,

Mr. Leach Barrett moved a vote of thanks to the chairman and directors for the able manner in which they had conducted the business of the company.

The motion was seconded by Mr. Woodrow and carried unanimously, and, after a brief acknowledgment from the Chairman, the proceedings closed. —*The India-Rubber and Gutta-Percha Trades Journal*, Dec. 24,

CAMPHOR MANUFACTURE.

Formosa.—The so-called "camphor factory" built by the Government at the capital, Taihoku (Taipeh) is the most imposing in appearance of any of Formosa's industrial establishments. It consists of one main building containing the distilling apparatus for grade A camphor, one building equipped with the necessary apparatus for the extracting of camphor from camphor oil, a large warehouse for storing the drug, a packing house and numerous out-houses, including barrack-like quarters for the labourers, and neat little cottages for the skilled workmen, officers, &c., connected with the factory. The factory buildings are big, solid structures of brick and stone, and provided with not only the latest hydraulic and steam-pressing machinery, but with much apparatus specially designed for the work. The grounds and buildings are illuminated by electricity supplied by the factory's own plant. The buildings impress one as having been erected with the idea of permanency, and the Formosa Government evidently hopes to control the camphor situation for many years. The preparation of the two grades, A and B (crude) camphor, is as follows:—The camphor is obtained by steaming camphor-wood chips in roughly built furnaces set up on the hill districts. A vapour arises from the steaming wood, and condenses in cooled wooden receptacles forming a snow-like deposit of camphor, containing, however, some quantity of oil. After removing the camphor from the condenser, it is allowed to drain in tubs, until a considerable portion of the oil has run off. The camphor is then packed in canvas bags, and transported to the central office at the capital. The camphor destined for shipment as crude is not subject to further treatment after leaving the country districts. For shipment it is packed by hand in zinc-lined cases, holding about 1 picul (133 pounds). This grade is similar in form to the crude camphor exported prior to the establishment of the monopoly, although the Government has been able to improve it somewhat in quality. The camphor for grade A blocks is treated at the factory described above. The plant possesses six large distilling furnaces measuring some 24 by 12 by 5 feet, and two crystallization chambers some 30 by 24 by 24 feet. Several thousand pounds of the crude camphor are placed in one of the large iron retorts, and, after the openings in the latter have been closed and sealed, air is forced in to hasten evaporation. For the first forty-eight hours a slow fire is maintained, which is sufficient, however, to drive off the water and oil, these passing through a pipe leading from the top of the retort into a tank cooled by water. The heat is now increased, and the above pipe having been shut off and a second one opened, the camphor fumes pass through the latter into the crystallization chamber the roof of which is cooled by running water. Here it crystallizes as flowers of camphor. The camphor is now ready for pressing. This is accomplished by first shaping the camphor into the form of a block by the use of wooden moulds. The block is then pressed by steam power, and, lastly, is subjected to a very high hydraulic pressure. The result is a hard, almost opaque bric of practically pure camphor, weighing 10 kin (13⅓ pounds). These blocks are now wrapped in oiled paper, and packed in zinc-lined boxes holding ten, and, after receiving the Government label of "crude camphor, pressed by the Formosa Government," are handed over to the selling agents. The Government factory has at present a yearly capacity of some 2,700,000 pounds of grade A. The total Formosa Government expenses, including cost of camphor, are given in the Budget for 1900 as 2,127,611 yen ($1,063,805), and the receipts as 3,455,035 yen ($1,727,512). This leaves a profit of 1,327,424 yen ($663,712), or about 34 (yen $17) a picul (133 pounds). This is taking the maximum production for the year at 39,000 piculs (5,187,000 pounds). Some 2,000,000 pounds of camphor are consumed in the United States yearly.—*United States Consul ta Formosa.*

COFFEE NOTES.

Less than five years ago the first coffee seeds were introduced into Uganda by missionaries. Now there are extensive crops under cultivation. Last year 100 tons were exported from Uganda, and this year this amount will be greatly exceeded. The quality of Blantyre coffee is said to be the best in the world, superior even to the famous Mocha.—*Commercial Intelligence.*

The heavy receipts of coffee at the port of Santos in Brazil are attracting attention in the trade, as well they may. Notwithstanding that the arrivals are much below the normal volume, the total for the two ports is not far below the figures a year ago, when prices were at about their lowest point. The effect of these heavy receipts on prices has been helped by the receipt of estimates pointing to a liberal crop of Rio and Santos coffee the coming season.—*Merchants' Review*, October 5.

INDIA AND FRENCH IMPORT DUTIES.

Calcutta, Dec. 22.—A Press *Communiqué* issued here today by the Finance Department, states that the enhancement of French Import Duties on Indian coffee, pepper, etc., has been postponed for six months, till the end of June, 1901.—*Madras Mail*, Dece. 24.

MICA.

The mining community is much exercised at he determination of the Bengal Government to enforce the rule for the exaction of a royalty of 2½ per cent on all rough mica taken from the mines. The royalty clause has always been inserted in the leases, but hitherto it has remained a dead letter, owing to the difficulty in determining the precise output of the mines. Not long ago Mr. Wild, the Conservator of Forests, Bengal, was round inspecting the mica properties within the forest area with a view of settling this question, and later on Mr. Grundy, the Inspector of Mines, made an exhaustive examination of all the mines now being worked and collected data regarding the output of rough and dressed mica, average value of merchantable mica etc.; and it is believed that his report will embody the opinions of the chief owners as to the manner in which the royalty should be levied. The consensus of opinion is against the royalty being levied on the gross output, since much of the mica that comes to the surface is thrown away as being useless, and it is unfair to demand royalty on what is of no value. The better plan would be to exact a royalty on all mica conveyed to the dressing floors. The amount and value could easily be arrived at, as it is well known that each maund of rough mica yields only one third of a maund of dressed mica. The average price of mica (big and small) is R60 a maund in Calcutta. The cost of dressing and transport may be set down at R10, which would leave R50 as the net value of one maund of dressed, or three maunds of rough, mica at the pit's mouth. This would mean a royalty of 7½ per cent on each maund of dressed mica despatched from the mines. —*Indian Agriculturist*, Dec. 1.

BURMESE GOVERNMENT'S RUBBER PLANTATION.—The Government of Burma proposes starting shortly an extensive rubber plantation on King's Island, the principal island of the Mergui Archipelago.—*Hongkong Weekly Press*, Dec. 29.

THE CORPORATION LIMITED.

(OF CEYLON).

Directors.—Alfred Bull, Cyril Gurney, E H Hancock, T J Lawrance, R R G Norman, V H Smith.

Managing Director in Ceylon, Frederick Tatham.

London Agents, Antony Gibbs & Sons.

Report of the Directors, and Accounts for the year ending 30th June, 1890, to be submitted to the Annual General Meeting of Shareholders on the 6th December, 1900.

The Directors beg to submit herewith the Accounts of the Corporation for the year ending 30th June, 1900, which, they are sorry to say, do not show the results reasonably anticipated, owing to the abnormally low prices which have prevailed in the tea market for a considerable time past.

The following figures indicate the results during the past three years:—

	Crop. lb.	Cost of Production.	Average Sale Price Nett.
1897-98...	1,112,606	31 cents per lb.	5d.
1898-99...	1,234,442	26·10 „	5 15-16d.
1899-00...	1,276,139	25·60 „	5 3-16d.

From these particulars it will be seen that the estimate for the past year, 1,250,000 lb., has been more than secured at a reduced cost; only normal prices are required to enable the Company to show much more substantial profits.

In view of the present relations of supply and demand, it has been decided not to develop the property on the lines roughly sketched in the last report.

Economies have been effected by a reduction in the agency charges and in management; the inclusive London charges on the tea are now considerably under 1d per lb.

The total profit for the year is £6,037 6s 10d. After deduction of Debenture Interest, London expenses, etc., there remains a balance of £1,646 14s 9d.

The Directors have paid a further half-yearly dividend on the Preference Shares in addition to that mentioned in the last report as having been paid on 1st August, 1899, and regret their inability to further reduce the overdue Preference dividend at present.

Mr. Tatham hopes to secure about 1,300,000 lb of tea for the current year at about 26 cents per lb and advises the Board that a fair cocoa crop is practically assured.

Forty tons of plumbago have been won during the year. The Directors have employed an Engineer to advise upon and assist in the mining operations, and much had been done by the 30th June. Since that date there has been a substantial output, and it is hoped that a further profit may be shown this year after writing off a considerable portion of the amount which at present stands in a suspense account.

VITICULTURE IN TRANSCAUCASIA.

According to official figures supplied by the Department of Agriculture at St. Petersburg, the area of land under cultivation of the vine, and the production of wine in Transcaucasia are as follows:—The Government of Tiflis 65,516 acres, and 6,750,000 gals.; the district of Zakatal 1,938 acres, and 22,000 gallons; the Government of Kutais 94,277 acres, and 4,050,000 gallons; the Government of Elizaretpol 33,701 acres, and 2,700,000 gallons; the Government of Baku 27,283 acres, and 2,160,000 gallons; the Government of Erivan 19,926 acres, and 675,000 gallons; the Government of Daghestan 6,420 acres, and 540,000 gallons; the Government of Tchernomoria 1,493 acres, and 135,000 gallons; and the district of Kars 121 acres, and 11,000 gallons, making a total area under cultivation of 250,675 acres, and a production 17,043,000 gallons. The figures given above according to Consul Stevens do not include the grapes grown for sale in the markets of the Caucasus, and the quantities consumed by the distilleries, the total of which amount was as near as possible 108,900 tons. Although viticulture in the Transcaucasus is by no means a new industry, it has, nevertheless, not yet been able to reach that state of prosperity which could entitle it to be classed amongst the industries of the country that form one of the mainstays of the population. This, of course, is due in a great measure, to the ignorance of the inhabitants, and the lack of the knowledge necessary to carry on the cultivation of the grape in a systematic manner, and on principles which would be more or less in keeping with the climatic conditions and varied soils of the different altitudes at which the vineyards are situated. Grapes grow in a wild state almost throughout the Caucasus, and with a little pains there is no doubt that the industry might be raised to a state of efficiency which would considerably enhance the revenues of a large majority of the population of the Caucasus, and thereby increase the prosperity of the country. Although the production of wine has attained figures of fairly large proportions, most of the wine is consumed in the country, and only a very small quantity finds its way to St. Petersburg and other Northern Russian markets. The greater part of the wine made is very inferior in quality, and in most cases is "heavy" and "heady." With a very few exceptions, owing to the poverty-stricken condition of the wine growers who have no possibility of keeping their wines for any length of time, it is sold and consumed as soon as it is made. This, in itself, does not give an opportunity of properly testing the wine, which, if kept long enough, would doubtless undergo a complete change for the better, as has been proved by the wine made on the estates of the Imperial Domains and those belonging to the wealthier wine-growers of the Caucasus. Other drawbacks in the shape of phylloxera, black-root, oidium, mildew, and the diseases of a fungoid nature which have become chronic, continue to cause havoc among the vines, and are a constant source of trouble and anxiety to grape-growers. In many parts of the Caucasus severe local rain and hailstorms have also ruined extensive areas of vineyards.—*Journal of the Society of Arts.*

PARIS EXHIBITION: SECTION OF CEYLON.

MUSEUMS AND NATIONAL INSTITUTIONS TO WHICH EXHIBITS HAVE BEEN PRESENTED IN THE NAME OF THEIR EXHIBITORS.

1.—PHILADELPHIA COMMERCIAL MUSEUM, U. S. A.—Plumbago, Mr J W C De Soysa; Cinnamon, Mr Jacob de Mel; coconut products, Messrs Vavasseur & Co.; coconut oil, Mr Arnold Dias; tanning products, Mr W D Carolis; coffee and cacao, Lipton Ltd.; coffee, Mr Gibson; coffee, Mr G H Barber; cardamoms, Mr J Westland; cardamoms, Mr J A Spence; bixa

seed and paste, Anatto Dye Works; banana flour, Mr C Stouter; white pepper and cloves, Messrs Darley, Butler & Co.; arecanuts, Mr J H Meedeniya, R. M.; nutmegs, Government of Ceylon; pepper, Government of Ceylon; copra, Government of Ceylon; rubber, Government of Ceylon; cardamoms, Government of Ceylon; wild fibres and ropes, Government of Ceylon.

2.—STADISCHES MUSEUM BREMEN.—All the following exhibits of Messrs Darley, Butler & Co.:—Plumbago (in case), coconut oil, poonac, copra, fibre and yarn, kitul fibre, palmyra fibre, cinnamon, essential oils, Mr Jacob de Mel; mica, Mr Kuruppu.

3.—JARDIN COLONIAL, PARIS.—Coconut and copra, Mr W H Wright; plumbago (part of), Mr U D S Goonesekera; cinnamon (part of), Mr Jacob de Mel; coconut oil, Mr A P Goonatilleke,

4.—AGRICULTURAL MUSEUM, BERLIN.—Plumbago (part of), Mr Jacob de Mel; collection of wild fibres, Government; collection of medicinal plants, Government; coconut fibre and cord, Messrs C P Hayley & Co.; cardamoms, cocao, &c., Mr J H Renton.

5.—FIELD COLOMBIAN MUSEUM, CHICAGO.—Plumbago (part of), Mr U D S Goonsekera.

6.—MUSEUM D' HISTOIRE NATURELLE, PARIS.—Plumbago (part of), Mr U D S Gunasekera; plumbago (part of), Mr Jacob de Mel; Fauna collection, Government; elephant and skeleton, peacock, 14½ pairs of birds indigeuous to Ceylon, two wild boar, one axis deer, one cobra, one ticpolonga, five flying foxes, group of wanderoo monkeys, two flamingo, and two juule fowl.

7.—AUSTRALIAN IMPERIAL MUSEUM.—Plumbago, Messrs Clark, Young & Co,; fibre, Horrekelle Estate Co.; cinnamon, Mr Jacob de Mel.

8.—MUSEE DES COLLECTIONS, MANUFACTURE NATIONALE SEVERS.—Seven pieces Kandyan pottery, Government.

9.—IMPERIAL AND ROYAL NATIONAL MUSEUM OF HUNGARY, AT BUDA PESTH.—Five life-size figures in plaster, Government; Model of a Tamil house, Government.

10.—MUSEE INDUSTRIEL, ROUEN.—Plumbago (part of), Mr U D S Gunasekera; cinnamon (part of), Messrs Miller and Branwell.

11.—MUSEE INDUSTRIEL, LYONS.—Plumbago, Mr H B Fernando; cinnamon, Messrs Miller and Branwell.

12.—ROYAL BOTANIC GARDENS, KEW.—Sample of tea, furnished by Mr J H Renton; coffee, cacao, coffee and cardamoms, specimens of medicinal plants, Government.

13.—STATE MUSEUM, HAMBURG.—Plumbago, Mr L B A de Silva; fibre, Mr U D S Gunasekera; Cinnamon (part of), Mr J de Mel; coconut oil, Mr G C Warr.

14.—INDUSTRIAL MUSEUM, BONN.—Plumbago (part of), Mr Jacob de Mel; mica dust, Mr W Kuruppu; coconuts, Messrs Murdoch and Branwell.

15.—BRITISH CHAMBER OF COMMERCE AT PARIS.—Plumbago, Messrs Delmege, Forsyth & Co.; mica, Government collection; mica dust, Mr W Kuruppu; all pamphlets and reports available on Ceylon Tea and other industries, from the Chamber of Commerce and the Planters' Association.

16.—IMPERIAL ART GALLERIES, VIENNA, (DR. EDER.)—Two landscapes, Mr W D Bosanquet.

17.—IMPERIAL INSTITUTE, LONDON.—Collection of products of the coconut palm, Messrs G and W Leechman; cardamoms, Mr J A Spence; cinnamon, Mr. J W C De Soysa; vanilla (part of), Mr Vander Poorten; cinchona, Mr F G A Lane; cinchona, Mr G S Anderson: cinchona, Mr G B Christie; arrack (collection) (with model still), Mr Arnold Dias; plautain flour, Mrs Arnold Dias; anatto (complete collection), Mr A VanStarrex; plaintain flour, Mr W D Carolis; various flours, Government; pepper and cloves, Messrs Darley, Butler & Co.; sugar, Jayasinha Mudaliyar; resin (collection of), Government; various preserves, Ponnan Nendali aud K A Perera; bêche de mer, Government; metal cleaning-powder, D Johannes; dubbing, J Baptist.

KOKARI FISHING IN THE ANDAMAN ISLANDS.

BY MAJOR G. MASSY.

(*Badminton Magazine*, January.)

A somewhat novel methods of handline fishing may frequently be seen in the Andaman Islands by those whom fortune (or misfortune) should take to that little-known penal settlement in the Bengal Ocean. The fishing is carried on during fine weather by certain native convicts of 'self-supporting' class, *i.e.*, men on a short of ticket of leave, who earn their own livelihood; and, as they can generally get a ready sale for their fish, the pursuit is a fairly profitable one. They fish from dug-out canoes, in handling which they are very expert. The crew, as a rule, consists of a steersman, one paddler, and the fisherman, who sits in the bow and is in command of the boat. They carry a good-sized casting-net, similar to those used in England, for catching bait with, and a large wicker basket for keeping live bait in. When required for use, this is slung overboard, and is provided with a canvas flap over the top of it, to prevent the bait from jumping out. It corresponds to the 'courage' which is employed for a similar purpose in sea fishing on some parts of our coast. In lieu of a gaff, a long-handled spear, with a small barbed head, is carried. The fishermen say that it is much easier to use than a gaff; and certainly I never saw one of them miss a fish with one.

The handline, which is a fine one, made principally of silk, is about 150 yards long, and is kept carefully wound round a stick or in a ball, to ensure its running easily when playing a fish. I believe these lines are procured from the east coast of Madras. A medium-sized hook completes the tackle. From this it will be seen that, though a hand line is used, it is no means the pull-and-haul kind of business one generally associates with that kind of sport. Far from it. The line being very fine, a light hand and considerable skill are required to ensure success.

This fishing is usually carried on near the jetty on Ross Island. The water there is deep, and, except, of course, during bad weather, of crystal clearness. Standing on the jetty, one can see countless numbers of fish of all kinds in every direction, and in the clear water every moment can be distinctly traced. Large shoals of sardines disport themselves on the surface, occasionally making frantic dashes for safety under the wooden piles of the jetty, as the hungry kokari pursue them and reduce their num-

bers; other enemies, too, are on the look-out for them—amongst them being barracouta, garfish and horse-mackerel; and further out to sea seer-fish—but the kokari are the most numerous. But here come some of the fishing-boats, paddling as if for dear life now that they see the fish are on the feed—so we will watch one of them at work. Arrived near the jetty, the fisherman slings his basket over the side of the boat, prepares his net for a cast, and looks out for a good shoal of sardines. As the sea is teeming with them this does not take long, and in a few minutes the net is hauled on board with a goodly supply in its meshes; these are quickly transferred to the basket, all hands working busily at the job. One or two more judicious casts, enough live baits have been caught to enable a start to be made, and our fisherman begins business. Squatting down in the bows, he uncoils some twenty yards of line, and baits his hook with a live sardine by hooking it carefully under the back fin. Keeping his baited hook in the water alongside him, he throws out two or three sardines about twenty yards from the boat to attract the kokari. These are taken almost immediately, and out go a few more, followed this time by the hooked one, which is dexterously cast into the midst of the others; there are several boils and splashes on the water, then the line tautens, our friend strikes, but is too late, and his bait is gone. He hauls in the line with feverish haste and repeats his cast; this time with more success, and is at once fast in a good fish which dashes madly out to sea as fast as it can go.

The canoe follows as quickly as the paddlers can make it travel. The fisherman, holding his hand well up, lets the line slip through his fingers, feeling his fish all the time, and not letting him take out line too easily. At the same time he excitedly screams contradictory directions to his crew, and curses them freely for not going fast enough. His object is to peep over his fish as much as possible. After going about a couple of hundred yards or so he gets a pull at his fish, and begins to recover some of his line, the boat still following every movement of the quarry, and, when skilfully handled, doing half the work of killing it. After another good run or two the fish shows signs of being done, and he is gradually brought gasping to the surface. The man in the centre of the boat drops his paddle and takes up the spear—a sharp stab and a hoist, and the fish lies quivering in the bottom of the boat . . . a grand fish he is, too, close on 20lb. weight. Locally called a kokari, he belongs to the Caranx family, has a large deep head and powerful jaw armed with numerous teeth; he is deep and somewhat flat-sided in the body. His pectoral fins are peculiar, being long and curved, and shaped somewhat like a sickle; he fines off very much towards the tail, which terminates in a large fork, and in some species the root of the tail is armed on either side with a sort of sharp bony ridge. The colour varies, a silvery hue predominating, but some are of the most beautiful ultramarine blue. Altogether he presents a very game and handsome appearance, which as far as his fighting qualities go he does not belie, as harder running fish it would be difficult to find.

The boat is soon back at the jetty again ready to recommence operations, and with decent luck our friend will have two or three more fine fish before he leaves off, varying in size for 7 to 20 lb. It was very entertaining to watch them at work on a day when the fish were taking well, and I need hardly say that some of us who were keen fishermen were not content with watching only, but soon followed their example, using rods instead of handlines, but otherwise fishing in the same manner; and very good sport we frequently had, which made amends for being stationed in such an out-of-the-way part of the world.

COFFEE PLANTING IN SUMATRA.

We are always pleased to hear from our old friend "W. T. McK." who, after leaving troops of friends behind in Ceylon, has been so many years now in Sumatra without making a fortune. He sends us as usual a graphic letter (given in our daily and *Tropical Agriculturist*) with some useful statistics, showing that his district of "Serdang" has about 10,000 acres under Liberian coffee. The photograph he sends, shows magnificent giant coffee trees (backed by Albizzias) laden with crop; for, of course, the soil is superior to anything we have in Ceylon. But then the market price of "coffee" has, for a long time, been even more disappointing than that of tea!

ELEPHANTS IN BURMA.

The year 1899 was a most disastrous one for the Government elephants in Burma, numbers of which died from an outbreak of a disease believed to be anthrax; contractors and others suffered similarly, and elephants to replace losses cannot now be easily purchased. Several officers have therefore suggested instituting Keddah operations in Burma and the Local Government is now in correspondence on the matter with the Suprintendent of Keddah Operations in India. It seems clear, however, that operations in Burma will not be easy to arrange as there is no chance of success, unless trained men are employed on the work and money liberally spent.

The Forest Officer in charge of the Mu Division writes:—

"The Bombay-Burma Trading Corporation, Limited, increased their stock of elephants in the division to almost 100 beasts. Contractors and licensees, however, are unprovided with these useful beasts, and cannot always pay R3,500 for a tusker and R2,500 for a cow, which are the present prices. Advances might do something in improving extraction, but one looks with longing at the three or four herds of from 40 to 80 beasts each which roam over the division, and which are rapidly being shot down by Burman hunters for the sake of a few rupees worth of flesh. Kheddah work, too, would be especially easy in this division, as for instance in the Thaw basin, where heavy forest is not continuous and the herds are often restricted to small isolated areas."—*Forest Administration in Burma for the year* 1898-99.

OUR EXPORT IMPORT AND SHIPPING TRADE FOR 1900.

The Export trade of 1900 compared with 1899 must be recorded as not altogether satisfactory. For some products, prices were maintained; for a few prices were dearer; but against this, two of our most important exports fell seriously in value, and one further fell off in volume considerably.

CARDAMOMS.—The export to India increased last year 100 per cent, but prices generally were lower both locally and in London. A slightly firmer tendency was noticeable as the year closed. The total exports exceeded those for 1899 by 37,496 lb. More land is coming into bearing and a heavier export must be looked for in 1901.

CINNAMON.—The crops for 1900 were good, the result being an increase in export of quills to the extent of 163,080 lb and of chips to the extent of 34,279 lb. Prices, notwithstanding the increased production, have been maintained. Quills (taking usual assortment as average) have not fluctuated locally during the year more than 1½ cent per lb and values in London have not shown much rise or fall. Chips have fluctuated between R87·50 and R92·50 per candy. Both quills and chips are more and more being shipped direct to the consuming countries, and the result of getting at the consumer direct is very clearly shown by a perusal of the following figures:—

	Quills lb.	Chips. lb.
In 1890 the exports were:—	1,894,514	441,447
1900 " "	2,678,111	1,863,406
Increase	783,597	1'421,959

In 1890 usual assortment was worth 30 cents per lb. Chips R60 per candy.

In 1900 usual assortment was worth 57½ cents per lb. Chips. R90 per candy.

Notwithstanding that during the decade we have increased our exports of quills by 35 per cent and quadrupled our export of chips, the value of quills has advanced nearly 100 per cent and chips about 35 per cent.

The export of wild cinnamon, which for a short time threatened to injure sales of plantation and garden cinnamon, has now practically ceased. The value of wild cinnamon in London is barely sufficient to pay the freight and dock charges there. In one or two instances wild cinnamon chips have been mixed to a small extent with usual chips, and exporters will have to very closely watch deliveries.

CINCHONA.—This bark continues to decrease as regards quantity harvested and shipped; and some years must elapse before recent plantings, tell.

COCOA.—The export for 1900 (33,476 cwts compared with 42,745 in 1899) shows the lowest record in volume since 1896. Prices in Europe ran high for good bright beans, and for really fine bright bold beans extreme prices were realised, the latter were worth R57·50 per cwt. locally at the close of the year, compared with R47 at the same time 1899. It is hoped this year's crop will be a larger and a better one.

COCONUT PALM PRODUCTS.—All the products of the coconut palm:—coconut oil, copra, poonac, desiccated coconut, coconuts, coir rope, yarn and fibre exported—show a material increase in volume and prices have been fully maintained. Everything points to a continued good demand for these products, and coconut land may be looked upon as one of the soundest local investments.

A., COCONUT OIL did not fluctuate as much as usual during the year, prices in Colombo varying from R315 to R330 per ton f. o. b. Shippers have practically ceased sending oil to London and New York for "spot" sales, and the almost entire absence of unsold stocks at these ports has kept exporters in Ceylon well supplied with orders. Exports show an increase of 2,149 tons over 1899, the increase being principally for U K and India. As the year closed, value of f.o.b. oil was R325 per ton. 1892 still remains the record year for export of coconut oil.

B., COPRA.—The increase in export for 1900 was 1,853 tons, principally for Germany, Austria and Italy. Russia and United Kingdom show a falling-off. Prices generally have been good, and during the last three months of the year ran very high, the arrivals not meeting the demand for export. Extreme prices led to eagerness on part of growers to get copra into Colombo before reaction set in. This led to imperfectly dried copra arriving, the loss in weight on which must be a serious item for shippers.

C., POONAC.—With an increased export of oil, we must of course, be prepared for an increase in shipments of coconut cake. The export for 1900 was 9,299 tons against 8,739 tons for 1899. Prices dropped during the last six months of the year from R80 to R70 and the outlook for 1901 was not very promising.

D., DESICCATED COCONUT.—The export for 1900 was 13,604,913 lb. against 13,571,084 lb. for 1899.

E., COCONUTS.—A large increase in nuts exported took place last year, the figures being for 1900, 14,995,909 nuts against 11,723,392 nuts for 1899, the increase being practically divided between U. K. and Egypt.

F., COIR ROPE, YARN AND FIBRE.—All these show an increase in volume exported, and prices have also been well maintained.

COFFEE.—This product in 1899 had improved somewhat over 1898, but figures for 1900 show even smaller exports than for 1898.

ESSENTIAL OILS.—There is not much change to record in these oils.

PLUMBAGO.—The fall in values indicated as taking place at the close of 1899 continued steadily during last year, notwithstanding a large decrease in quantity exported. In 1899, 30,819 tons were exported against only 19,167 last year. The principal decline in offtake was to U. K. 2,821 tons, Germany 1,159 tons and America 6,905 tons. The restricted local demand led some dealers to consign portions of their stocks to London and elsewhere for sale, a course of action more than any other calculated to depress the market and force prices down. Shipments of an article like plumbago

unsold, generally mean sacrifice, and only form a lever for buyers to force down prices. Values still paid locally are, however, good when compared with those ruling some three and four years ago, and many pit owners must still be getting good returns.

The extreme prices paid for plumbago towards the close of 1899 and early in 1900 led to a rush after plumbago land, resulting in absurdly high prices being paid for land and leases, and to pits being opened up recklessly. In many cases efforts have not only been unsatisfactory, but in some instances have had disastrous financial results. Quite a number of pits were abandoned during the latter half of 1900.

The following comparative table of quantities and prices at close of last two decades are interesting :—

In 1890 exports aggregated 19,287 tons, in 1900 19,167 tons and the following were respective values per ton.

	In Dec. 1890	In Dec. 1900
Large lumps	R170 to R250	R400 to 650
Ordinary lump	125 to 225	200 to 600
Chips lump	60 to 130	125 to 400
Dust lump	30 to 85	75 to 225

TEA.—This staple article is kept so constantly in print, that all our readers must feel well nourished. so far as "facts and figures" are concerned. A return to better teas from medium and low-country estates will, in course of time, remedy the disastrous state of affairs ruling as the year closed. Closer supervision is wanted in many factories as the samples of "estate bulking" go to prove. If one portion of the factory work is not carried out properly, it is natural to conclude the manufacture of the tea is not receiving proper supervision.

The following are Exports for the year 1890 and for the past three years :—

	U. K.	Continent.
1890	43,756,912	92,839
1898	96,133,833	3,591,106
1899	103,948,124	4,835,938
1900	113,760,193	10,213,169

	Australia.	America.	Other ports.
1890	2,559,901	204,223	287,679
1898	15,126,891	2,180,188	2,737,053
1899	15,606,833	3,080,002	2,423,259
1900	17,606,912	3,980,680	2,870,685

	Total.
1890	46,901,554
1898	119,769,071
1899	129,894,156
1900	148,431,639

EXCHANGE did not fluctuate suddenly during the year. The following is range of quotations.

6 m/s credits	1/4 23-32	1/4 1-4
3 m/s do	1/4 5-16	1/4 5-32
3 m/s D. P. Bills	1/4 5-8	1/4 7-32

IMPORTS.

Exchange fluctuated to some extent during the past year, demand remittances ranging from 1/3 15-16 to 1/4 5-16 and 30 d/s paper London on Colombo ranging from 1/3¾ to 1/3 7-8. Money was easy most of the year, local discounts ranging from 4 per cent to 9 per cent. As the year closed discounts were firming up and with large crops to finance in India and Burma during the next few months, we may expect money locally to be very dear.

COTTON GOODS.—The American cotton crop of 1900 fell far short of expectations, resulting in dear cotton all through the year. Mid Uplands ranged from 4d 13-32 per lb in January to 7d 3 8 in September. As the year closed, the price had gone back to 5½d per lb.

Dear cotton means dear cloth, and prices for all grey, white and coloured goods advanced with the rise in cotton. The higher the price, the more restricted the off-take, and 1900 was no exception to this rule. Only 3,088 packages cotton goods were entered for home consumption during the first eleven months last year, compared with 3,821 during the corresponding period of 1899. Locally, prices were generally unsatisfactory compared with costs laid down at Colombo.

The following figures show the importation for the first eleven months of 1900 and 1899 :—

	1899.	1900.
Grey cottons, bales & cases	2,628	5,198
White do do	2,259	4,135
Printed do do	1,142	835
Dyed do do	91	1,720
Coloured woven do	9,572	7,441
Sundry	112	81
Yarns, plain	1	30
do dyed	171	102
	15,976	19,542

WOOLLEN GOODS.—There is a growing tendency among the European as well as among the better-off Natives and Burghers to discard the time-honoured white drill suits for flannel clothes. This change has led to a large importation of coloured flannel. The initial cost to the buyer is greater, but in the end the flannel suit is perhaps the more economical and the better.

TOBACCO.—The importation of manufactured tobacco has increased considerably, due no doubt to a great extent to the influx of Boer prisoners and their guard.

MALT LIQUOR AND SPIRITS —The following figures show the quantities bonded and entered for home consumption during the first 11 months of last year compared with 1899.

Bonded.	In 1899.	In 1900.
Malt Liquor, in wood, h'hds	1,615	1,223
do glass, cases & casks	545	130
Brandy cases	1,962	1,741
Gin do	7,296	5,986
Whisky do	5,671	5,437
Entered for consumption :—		
Malt Liquor, in wood, h'hds	1,692	875
do glass, cases	205	482
Brandy cases	2,055	1,881
Gin do	6,056	5,349
Whisky do	5,362	4,255

It will be gratifying to those who are interested in temperance movements to note the large decrease in quantities of all spirits entered for consumption last year compared with 1899. The free consignments of cheap unmatured whiskies which were made some years back are gradually being liquidated, and whisky exporters of any standing are devoting their energies to the sale of the better brands.

MATCHES.—The quantity imported last year exceeded requirements and prices obtained locally were frequently under laid down cost,

CEMENT.—Owing to rise in freights from Europe eastward, prices of cement advanced about 1s per cask. With an article like cement freight is perhaps the chief factor in quotations.

METALS.—A fair business has to be recorded in most of the standard importations. Prices gave away considerably for all iron and steel goods, chiefly due to drop in prices in U.K. following an exceptional output in the United States. The following show some of the chief fluctuations in prices laid down Colombo Harbour.

	Jany.	July.	Dec.
Scotch iron	R165	175	150
4 oz. tea lead	,, 370	375	380
Hoop iron	,, 240	230	220

RICE.—Prices ruled high during last year. In January good Soolye could be got for R3 to R3-10 per bushel, but prices rose gradually, and as the year closed the value of this rice was from R3-50 to R3 75 per bushel. Bumper rice crops are expected in Burmah, and Bengal, and if anticipations are realised prices will become easier. Cheap rice will be welcomed by all Tea Estates, many of which cannot now afford to write off monthly "losses on rice."

COALS.—The "Chinese Embroglio" led to a large number of warships and transports from Europe calling at Colombo to coal last year. The extra demand coupled with a rise in value at home led to exceptional prices being paid for ready local delivery. Prices eased off towards the close of the year and are now quiet but steady. The imports of Indian coal still continue to increase. In 1899 there were 151,468 tons of Indian coal shipped from 1st January to 30th November from Calcutta to Ceylon, whereas last year for the corresponding 11 months the quantity was 297,803 tons, showing an increase of nearly 100 per cent in one year.

SHIPPING.

CEYLON EXPORTS IN RELATION TO FREIGHT AND TONNAGE—1890-1900.

The following figures—compiled from the Chamber of Commerce annual returns of exports and shipping—give the quantities of cargo exported from Ceylon, and the number of vessels by which this cargo was shipped. The figures for cargo exported are however reduced to "shipping tons" according to the Ceylon Tonnage Scale.

Readers will bear in mind that cargo transhipped at Ceylon is not included in these returns.

In	Vessels cleared with cargo.	Shipping tons cargo taken.	Average tons taken per vessel.
1890	698	156,159	223
1891	872	174,316	200
1892	871	200,986	230
1893	848	197,823	233
1894	808	200,489	248
1895	784	213,843	272
1896	830	216,844	261
1897	756	245,830	325
1898	773	297,211	384
1899	856	293,507	343
1900	826	316,004	382

The net increase in shipping tons of cargo exported last year over 1899 and 1898 was 22,497 tons and 18,793 tons respectively. It is gratifying to note that since 1890 the tonnage of cargo exported has increased by 100 per cent. The following are the more noticeable fluctuations last year compared with 1899:—

		Tons.
Tea	shows an increase of	18,537
Coconut oil	do	3,070
Copra	do	3,088
Coconuts	do	3,273
Coir rope, yarn and fibre	do	5,958
Cocoa	shows a decrease of	659
Plumbago	do	11,652

Grouping together the products of the coconut palm—coconut oil, copra, desiccated coconut, coconuts, poonac, coir rope, yarn and fibre—we find last year shows an increase of 15,983 tons, and the figures following are those for the last decade:—

	Tons.		Tons.
1891	69,879	1896	80,570
1892	94,550	1897	100,614
1893	79,935	1898	139,334
1894	85,711	1899	119,154
1895	84,567	1900	135,137

Of the total exports last year—

Tea gives	47 per cent. of shipping tons		
Products of the Coconut palm	43	do	do.
Other products	10	do	do.

These figures very clearly show how important the Tea and Coconut plants are for the shipping of Ceylon. If the Planting community have suffered from over-production of teas, they have provided shipping with a large increase of fine cargo.

The number of vessels which cleared *with cargo* last year was 826 compared with 856 in 1899. The supply of tonnage has been ample during the year to all countries, with the exception of Australasia. The carrying capacity of vessels running on regular lines touching at Ceylon continues to increase as new steamers replace those taken off.

Freights ruled low all the year round except to Australasia, as will be seen from the following table:—

	Rough Cargo		Tea.	
	Max. rate	Min. rate	Max. rate	Min. rate
	s	s	s	s
London	25	15	30	25
Antwerp	20	15	30	20
Hamburg	22-6	17-6	30	20
Marseilles	20	12-6	30	20
Genoa	25	20	25	20
Trieste	27-6	25	30	30
Odessa	40	35	40	40
New York	35	32-6	37-6	35
Melbourne	R50	R40	R50	R40

The raising of rate of freight from R40 to R50, combined with want of regular space available to the main Australian ports, has had a depressing effect on many of the local tea sales. Australian markets require Ceylon tea to arrive regularly, not occasionally in excessive quantities. Every effort should be made by exporters to secure a resumption of regular tonnage for tea to Australia. The following are fluctuations in rate of freight on tea to London during the last decade:—

	Max.	Min.			Max.	Min.
1891	45	27·6	..	1896	25	7 6
1892	35	15	..	1897	35	10
1893	30	12·6	..	1898	40	20
1894	35	20	..	1899	30	25
1895	30	17·6	..	1900	30	25

Native vessels and vessels which cleared without cargo from Ceylon are not included in these returns.

EXTENSIVE COCONUT PLANTING IN THE MALAY STATES.

Messrs. Price, Boustead & Co., of London, who have taken up 5,000 acres of land at Kuala Pahang for coconut planting, have had a large area cleared and nurseries laid for 20,000 plants. —*Perak Pioneer*, Jan. 3rd.

THE RIVAL CLAIMS OF TEA CHFS TS.

The following is the full text of the letter addressed by the Tea-buyers' Association, London, to the Indian Tea Association, London, relating to Patent Tea Boxes :—

I am instructed by my committee to call the attention of your Committee to the very undesirable packages in which Indian and Ceylon teas are being packed.

They believe that arrangements are now being, or are about to be, made by the gardens for next season's crop, and they feel that now is the time to put on record their opinion as to the most desirable package.

No doubt merchants are entitled to pack their teas in any kind of package they like but, nevertheless, my Committee think that buyers are entitled to say what in their opinion is the most suitable.

At present there are several kinds of package in use, viz., wooden chests with leaden linings, Venesta chests, Colinda chests, Esma Colinda chests, and Acme metal and Acme veneer chests. There may be others. Of these mentioned my Committee are of opinion that the old wooden chest, with a good lead lining, is the best. None of the others are free from serious objection. Metal chests, they consider, are the most unsatisfactory. It is a well-known fact that metal is a good conductor of heat and cold, and tea packed in metal chests is subject to every change of temperature. There is a certain condensation on the meta flt times which tends to give the tea a weathery flavour.

The tops and bottoms of these metal chests are very easily knocked out and; very frequently, buyers find several pounds of tea wasted in their vans. Neither are they good for repacking, and they cannot be cut down, or made smaller.

The Acme Veneer chest has, my Committee believe, been condemned, and will not be used after this season, but they understand those who are using it at present propose using the Acme metal chest instead.

The Venesta, Colinda, and Esma Colinda are very much alike, being made of three Plywood and having a thin lead lining. They are much too weak, and are easily broken and punctured. If they were made of stouter material and stiffened at the corners with battens inside, they would be much better. The leads used are frequently so thin, as to be of no protection, and my Committee are confident that the interests of the importers are considerably damaged by the use of such.

The reason why merchants are using these patent packages is, my Committee believe, because of the difficulty of getting wood; but they are assured that an unlimited supply can be obtained from Sweden, and it would cost no more than the patent packages.

I therefore desire to reiterate that the most satisfactory package is the old wooden chest with sufficiently thick l ad lining, and some members of this Association have informed the Committee that they will not buy tea packed in any patent package, if they can possibly avoid it.—(Signed) J A BROWN, Secretary.

UNITED STATES TEA EXPERIMENT.

For three-quarters of a century, attempts have been made to make tea-growing a profitable industry in the United States. At the South Carolina Experiment Station, Doctor Shephard is endeavouring to utilize the labor of idle colored folk, including children, with fair success. In his annual report to Congress, Secretary of Agriculture states that the experiments so far conducted have shown that tea may be produced in the United states in two ways: First, by families in their gardens, as was demonstrated years ago to be entirely feasible; second, on a commercial scale, after the manner followed by the British East Indian tea establishments and the beet-sugar industry.

In the future special attention will be given to manufacture of pure green tea. This subject is now claiming the attention of both inventors and planters in the British Colonies, as they begin to realize the hopelessness of bringing American tea drinkers to use the black tea instead of the green. The manufacture of green tea in the United States can be made successful only by the invention of machinery which shall take the place of expensive hand labor and prevent the waste which accompanies the latter. The questions are all being investigated by the Department, and, in addition, it is giving special attention to a study of the conditions in various parts of the South, with reference to determining the localities where tea can be grown to best advantage. Experiments have been inaugurated by some of the experiment stations, and plants distributed with a view of putting the work on a substantial basis. Much need is felt for young men capable of taking up this important problem, and it would be well for the agricultural colleges of the South to bear this matter in mind.—*American Grocer*. *Dec.* 12.

GOOD WISHES FROM A PLNTER AT HOME.

Glasgow, Dec. 6.—I see by the weekly *Observer* which reached me a couple of days ago, that you have been celebrating your 40th year of work in Ceylon, and that appreciative notices have appeared in the local press. I am not a whit behind anyone in my high estimate of the value of these services, and though late in the day would desire to add my voice to the general acclaim. A lot of the time you have been in the island I also cover, and all during that period I have always held that the *Observer* whose, free public life-work is most prominent has been consistently a high-class paper—with a conductor that had a conscience. May you have many more years ahead of you to continue your good work for the public weal, and may the public appreciate it in the form of supporting the journal—as it ought to do.

SPORT IN THE SOUDAN.

NOTABLE HUNTERS GOING OUT AFTER BIG GAME.

Paris, Dec. 28. Now that the Soudanese Government have afforded facilities for transport to Khartoum, several noted sportsmen are preparing expeditions to hunt and shoot over the territory bordering the White and Blue Nile. Big game such as elephants, rhinoceroses, and buffaloes are plentiful in this region, and French sportsmen are keen on being among the first in the field. One notable sportsman, Prince Peter of Arenberg, [who came to Ceylon on a shooting trip a little over a year ago.—ED. *C.O.*] has already arranged to go out to the Soudan with several friends and proposes starting immediately for Cairo.—*Daily Express*.

TO ALL PARTS OF ASIA, AFRICA, AMERICA AND OCEANIA.

Seeds & Plants of Commercial Products.

Hevea Brasiliensis.—Orders being booked for the coming crop August-September delivery 1901, booking necessary before the end of April, quantities of 100,000 and over at special low rates. Plants available all the year round. 100,000 and over at special low rates. A leading Rubber planter in Sumatra, who purchased 50,000 seeds in 1899, and 100,000 in 1900, writes us, under date 15th November 1900:—"I received your letter of 20th October, from which I learn that you added another case of 5,000 seeds to replace the loss, &c. I am satisfied hereby, and even after this adding I am satisfied by the whole delivery of this year."

Castilloa Elastica.—True superior variety cultivated in Mexico, seeds from specially reserved old untapped trees. Orders booked for August-September delivery 1901, booking necessary before the end of March; large quantities on special terms; Plants in Wardian cases.

Manihot Glaziovii—Seeds and Plants available all the year round, 100,000 and over at special low rates. A Mexican planter in sending an order for this seed wrote on the 22nd August, 1900:—"If they arrive fresh and germinate easily I may send you larger orders, as they are for high ground where the Castilloa does not thrive."

Kickxia Elastica.—(*Funtumia Elastica*).—Seeds and Plants, orders booked. (Lagos rubber.)

Ficus Elastica.—Seeds available in May-June; booking necessary before the end of March; also plants.

Urciola Esculenta and **U. Elastica.**—Same as above. (Burma rubber.)

Parameria Glandulifera.—Orders booked for seeds for January-February delivery; also plants; immediate booking necessary. (A good rubber creeper of Malacca.)

Landolphia Kirkii.—Seeds in July-August, early booking necessary. Plants can be supplied all the year round. (A highly-recommended species.)

Chonemorpha *Macrophylla.*—Seeds and Plants; orders booked. (A very valuable rubber-yielding creeper.)

Memusops Globosa and **Payena Leerii.**—Seeds and plants in July-August, booking necessary before April.

Achras Sapota, Willughbeia Firma, W. Edulis and other **Rubber and Gutta Percha** yielding Trees and Creepers, Seeds and Plants.

Cinnamomum Zeylanicum (Cinnamon superior variety). New crop of seed in April to June; booking necessary before the end of February; also plants.

Coffee Arabica, Liberian Hybrid and *Maragogopie* **Hybrid.**—New crop March-April; immediate booking necessary.

Cinchona Ledgeriana.—Seeds now ready, also other varieties.

Seeds and Plants of Nutmeg, Clove, Sandalwood (white and red), Pepper, Cardamom, Vanilla, Cacao, Tea, Coca, Fibre, Medicinal and Fruit Trees, Shade and Timber Trees, Eucalyptus various varieties, also Palms, Bulbs, Orchids, &c.

Our enlarged Descriptive Price List of Tropical Seeds and Plants of Commercial Products for Foreign countries for 1901-1902, now being prepared, and will be ready in a few months.

"SOUTH AFRICA."—The great authority on South African affairs of 25th March, 1899, says:—"An interesting Catalogue reaches us from the East. It is issued by WILLIAM BROTHERS, Tropical Seed Merchants, of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbing. We recommend the great Powers and Concessionaries under them to go to William Brothers."

Price List of Seeds and Plants for CEYLON use post free on application.

Our new Descriptive Price Lists of Seeds of Shade Trees for Coffee, Cacao, Tea, Cardamoms &c., Timber Trees, Trees for Avenues, Hedges, Wind and Shelter Belts, Ornamental Trees, Shrubs and Climbing Plants; and Seeds and Plants of Palms, Calamus, Pandanus, Cycads, Tree and other Ferns, Crotons, Orchids, Bulbs, Dracinas, now being prepared, and will be ready shortly.

Special Arrangements made with foreign Governments, Botanical and Agricultural Departments, Planters and others for supplying seeds and plants of Commercial Products in large quantities.

Agents in London:—MESSRS. P. W. WOOLLEY & Co., 90, Lower Thames Street.

Agent in Colombo, Ceylon:—E. B. CREASY, Esq.

Telegraphic Address:
WILLIAM, VEYANGODA, CEYLON.
Lieber's, A.I. and A.B.C. Codes used.

J. P. WILLIAM & BROTHERS,
Tropical Seed Merchants,
HENARATGODA, CEYLON.

SNAKE POISONS AND ANTIDOTES.

Captain R. H. Elliot, I M S, delivered an interesting lecture a few days ago on "Snake Poisons and their Remedies" to the members of the Madras Young Men's Christian Association. In the absence of Dr. J. R. Henderson, of the Madras Christian College, Mr. G. Benton Smith presided. Dealing with antidotes to snake poisons, Captain Elliott said that the fallacies that occurred in connection with snake poision antidotes were innumerable, almost unbelievable, almost every village claimed to have unfailing remedies, most of them vegetable preparations for snake poison! People were never in doubt as to their efficacy; in fact they represented that they had tried and tested them and effected several cures with them. Several natives had come to him with such preparations and he found them all, by repeated experiments, absolutely worthless. The several so-called cures they had effected with the preparations had either been scorpion stings, pricks by thorns or by sharp stones, or bites by harmless snakes. He invited the many natives who came to him with "unfailing antidotes" to submit themselves to an injection of a dose of lethal poison and then prove the effect of the cures on their own persons. Needless to say that the invitation was never accepted. In this connection he dealt with Professor Muller's strychnine cure. He pointed out that Muller talked nonsense when he spoke of strychnine being an unfailing cure. From hundreds of experiments he (the lecturer) had made with strychnine on different animals, he found it to be absolutely useless. Professor Muller's remedy had now been exploded altogether. In fact it was found that, in a large number of cases, victims of snake poison had been killed more by the administration of the strychnine than from effects of the poison itself. An injection of ammonia as well as the swallowing of it were also spoken of as antidotes, but he was convinced that this was also useless. Alcohol was equally useless as an antidote; on the other hand it did harm. Referring to the immunity of snake charmers, he was inclined to think that some of them had obtained a certain amount of immunity by rubbing small quantities of poison into abrasions in the skin. They had a wonderful control over snakes which had, like horses, to be approached and treated gently if they were to be kept under control. The mongoose had a very large amount of immunity. He was not then sure of the exact figure, but he believed that a mongoose, weight for weight, would require, to kill it, 25 times the amount of poison which would kill a rabbit. The pig also was somewhat resistent to snake poison. Peafowl and guinea-fowl which were commonly credited with immunity, were no more so than other animals. Cats and dogs, which were also credited with immunity, owed their reputation to the same cause as snake-charmers, namely to their wonderful dexterity.

The serum of the Russel viper was to some extent antidotal, but its antidotal powers were not sufficiently powerful to make it a marketable product. Besides there was a certain amount of risk in obtaining serum from snakes. The same was the case with the mongoose which was a very difficult animal to deal with. The serum of the horse contained certain protective properties out of which was prepared the anti-venine which was tried and found to be a good antidote against snake poison. But to his mind the hope of the future in this matter lay in separating from the snake poison itself its own antidote. It would be difficult to tell them exactly how he thought it could be done. He thought it was possible that in snake poison itself there was not merely a lethal matter that killed, but side by side with it, at all events separable from it by heat and chemical processes, there remained a remedy which would be very powerful as an antidote. He thought that possibly one might be able by very careful experiments to separate such a remedy from the bile of the snake. There was quite enough to encourage them to think that there was a possibility that either from bile or serpent serum, or possibly by inoculating these into a resistent animal, they would be able to obtain a body which would be more powerful and stable than anything that they possessed at present as an antidote.

Captain Elliot then exhibited to the audience snake poison in a small bottle; which, he said, was the largest collection of snake poison in the world.—*Pioneer.*

RAMIE FIBRE.

A PLANTER ON A BIG SCALE.

Among the passengers stranded in Ceylon for a fortnight or so, by the break-down of the French steamer "Sydney," is Mr H. C. Bluntschli, of Siak, Sumatra, who for seven years has been giving his attention to the cultivation of fibre-yielding plants, chiefly Ramie, and the preparation of the fibre therefrom. Mr. Bluntschli (who has, for many years, been a reader of the *Tropical Agriculturist*), has just returned from Europe, where he has been making a systematic study of fibres in many of the Continental centres of manufacture as well as in Bradford and other places in the United Kingdom, and he has entered into an advantageous contract for a steady supply of his raw product. Mr. Bluntschli says the great matter is to get the right plant to grow (and he purposes visiting China to see some of the fibre plants there, specially China Grass.) He cuts a crop from his Ramie fields every six weeks—save that twice a year or so there is a rest from growth during the dry weather. The machines he uses gives from 1 to 3 per cent of clean fibre fit for shipment, while some use is made of bye-products. Mr. Bluntschli has experimented with pineapple fibre, getting £30 a ton for two tons to Europe, with an order for any quantity; also with Aloe and other plants. But he deems Ramie, so far, the best and most profitable—the drawback, however, for the planter being that there are at present so few buyers, most of the Bradford spinners, after certain unfortunate experiences, refusing to touch Ramie. Mr. Bluntschli is to send us his latest report on the subject. He is to visit each of the local Botanic Gardens and Kandy and Nuwara Eliya, and we bespeak attention, hoping he will have a pleasant and interesting time. Our visitor, who is a Swiss, speaks English well; and we only wish we had a capitalist of his calibre to develope a new industry in fibres in Ceylon.

OUR TEA EXPORT FOR 1901:

CEYLON LIKELY TO SHIP LESS THAN IN 1900 BY 5 OR 6 MILLION LB.

SUCH is the belief of Messrs. Forbes and Walker (who estimate our total export of tea at 142 million lb. of which only 100 millions are likely to go to London) and this, we think, is a very reasonable calculation, considering the general determination to be more careful about plucking and the probability of poor fields being abandoned, apart from the proposed "ten per cwt." reduction taking effect. Our leading Colombo Tea Brokers deserve credit for the promptitude with which they put forward their Tea Exports Estimate each year; and it will be seen from the following table that, although on the whole they have been farther from the mark than the Planters' Association—due perhaps to any revision on their part not being taken into account,—yet, in two seasons at least, their estimate was nearest to the actual result. In the following table we cannot give the P.A. estimate for 1901, because it will not appear for some days yet:—

CEYLON TEA EXPORTS.

	Estimated by Planters' Association.	Estimated by Messrs. Forbes & Walker.	Exports as per Chamber of Commerce Returns,	Exports according to Customs Returns,
	lb.	lb.	lb.	lb.
1901	—	142,000,000*	—	—
1900	142,000 000	125,000,000	148,431,639	—
1899	125,000,000	124,000,000	129,894,156	129,661,907
1898	120,000,000	120,000,000	119,769,071	122,113,573
1897	119,000,000	105 000,000	116,054,537	114,466,318
1896	101,000,000	89,000,000	108,141,412	11,0095,358
1895	90,000,000	90,000,000	97,939,871	98,581,060
1894	88,000,000	90,000,000	84,991,714	85,376,322
1893	77,000,000	78,000,000	84,406,064	82,269,353
	"*Observer*" *Office Estimates*:			
1892	80,000,000†		71,153,657	72,279,984
1891	68,000,000		68,274,420	67,719,371
1890	46,500,000		46,901,554	45,799,512
1889	32,000,000		34,048,085	34,345,859

It may be explained that the Customs enter the exports as each shipment is put on board a vessel in the harbour; while the Chamber only takes cognizance of the vessels and cargoes as they clear from the port.

Seeing that 34,671,446 lb. of our crop in 1900 went to Other Countries than the United Kingdom (or an increase of 8,725,414 lb. over 1899), it is a very reasonable estimate to put down 42 millions as going to Other Countries in 1901. But that would leave only 100 million lb. for London against 113,760,193 million lb. sent in the past year—or a decrease of nearly 13¾ million lb. So mote it be; for certainly that would be a great relief. We see the next Indian Tea Crop is spoken of as likely to be 5 million lb. in excess from new acreage in hearing; but that more than this is likely to be reduced through careful plucking, so that the London market in 1901 should see no surplus of tea supplies from either Ceylon or India.

* Of which 100 million lb. to United Kingdom; and 42,000,000, to Other Countries. † Planters and merchants whom we consulted were greatly out in their anticipations, for this year.

THE PAST YEAR'S TEA TRADE.

In Messrs. Gow, Wilson and Stanton's circular which we issue as a Supplement, some interesting observations are made regarding the progress of the Indian and Ceylon tea trade during the past year. The total crop for export is estimated to reach 325,000,000 lb. (183,000 lb. being from India and 140,000 lb. from Ceylon) as against 305,000,000 lb. in the previous year; while the consumption at home and abroad was 310,000,000 lb. so that there was a surplus production of 15,000,000 lh. or two millions less than in the previous year. Reference is made to the adverse effect which the increase in duty has had upon the industry, and on the other hand to the satisfactory increase (13,000,000 lb.) that has taken place in the quantity taken by new markets, the greatest expansion being in Russia, and to the relief afforded by the reduction in warehouse charges. Dealing with Ceylon teas in particular the well-known Rood Lane brokers express the opinion that the heavy crop was due to the unusually favourable weather for flushing and the extensive use of manure, and while they admit that the quality from some estates has been very good, they show that on the other hand there was a larger proportion of poor liquoring teas. The manufacture of green tea is considered likely to afford much relief to the industry by reducing the production of black tea. Planters are also counselled to avoid coarse plucking. Figures are given of the imports, deliveries and stocks since 1897-8, and those for last year are given up to November.

CONTINENTAL MARKETS FOR INDIAN TEA.

(To the Editor of the *Home and Colonial Mail.*)

SIR,—A good deal of interest attaches to the recent resport by Mr. Harrington on "The Position and Prospects of the Continental Markets for Indian Tea." The real hope for the future of Indian tea lies in those markets. I have been a planter in India for many years, and have watched with much interest the gradnal development of the market for our teas in England itself. One thing which has all along struck me forcibly is that our Indian teas cannot force any market by a direct frontal attack. In England we had from the first a great deal in our favour, from the mere fact that Indian tea is grown by our own countrymen and with our own capital, but for all that it took many years to educate people up to the fact that the Indian article was better than the China. People now fully acknowledge that it was only by *blending* Indians with Chinas that the market was captured at all; so that until about eight or ten years ago it was practically impossible to buy pure unmixed Indian tea in any town outside London.

It was the same with the American campaign; no success attended the efforts of the commissioners for India and Ceylon until they worked through the *existing trade*, and subsidised the *dealers* who were already in possession of the market for Chinas, when they made purchases of Indians, either for selling pure or for blending as they might think fit.

The frontal attack is an old mistake, but it is still being repeated. The Indian Tea Association is attempting to force the consumption of our tea on the Continent in direct opposition to the merchants engaged in the China trade; even Mr. Harrington still clings to the idea, although he admits that the only progress made hitherto has been by blending, and, what is more, that the only hope in the future for strong Assams is by blending. Then further on in his report he makes a sort of forced admission that "blending with Ceylon or even China leaf should not be entirely barred."

In the Continental market we have to face three things:—

1. The general dislike of everything British, and the jealousy generally regarding our Colonial possessions and trade.

2. The existing taste for China tea, as distinguished from Indian.

3. The merchants engaged in the China trade.

The third item is by far the most formidable, if we attempt to set up an "opposition shop."

Let the committee of the Indian Tea Association modify its policy. Don't *push* the establishment of separate houses for the supply of pure Indian tea, but work mostly through the merchants already in the tea trade; bring persistently to their notice the *fact* of the superiority of our teas for *blending* purposes. In doing this a double purpose will be served—the consumer will be gradually trained to appreciate a stronger and better tea, and the merchant will gradually use a larger proportion of Indian, until in course of time there will be no China left in his canister; our tea will beat it purely on its merits.

This has been exactly the course of events in Great Britain, in the Colonies, and will be everywhere.—Yours faithfully. C. B.

—*H. and C. Mail*, Dec. 28.

TRAVANCORE GREEN TEAS.

TO THE EDITOR, "INDIAN GARDENING AND PLANTING."

SIR,—As I have just despatched a small invoice of green teas to America I send you as promised a set of samples. Of course the teas are by no means extra fine, being made from ordinary medium pluckings, and as the hot weather is somewhat against manufacture of green tea leaf are almost certain to get a small amount of fermention while in transit from the field. Of the quality of the leaf there is little to be said, as it is very ordinary, but I venture to say the teas have the characteristics of true green teas of Mysore character.

One set of samples are plain, the other set of *the same tea* but slightly glazed. We are shamefully treated I consider, in that owing to the red tape rules of the I P A we are in practice debarred from getting "the grant-in-aid." Theoretically we can do so by sending samples to Calcutta from our shipping agents at Cochin, but we are told that the teas must *not be shipped* until the samples have been reported on and results made known, otherwise we lose the grant: this would mean a delay of three weeks at least and, if a steamer was missed during the interval, perhaps seven or eight weeks.

Common sense, one would think, would suggest that, the samples having been drawn and despatched to Calcutta by the Cochin agents, the teas might be allowed to depart by first steamer, the grant-in-aid being sent to the shipper if the teas passed the standard. Unfortunately, no one here but myself takes any interest in the question, and I am looked on as a sort of lunatic with a fad, but I venture to prophesy that within two years (unless prices mend, many will be making green tea for sale, of which there is a considerable scope in Canadian, American, and Russian markets. Later on, when the rains commence, I hope to go regularly at it, and then I shall send you samples of some really fine teas for price.

H. DRUMMOND DEANE.

Stagbrook, Peermaad, Travancore, S. India; 2nd Jan. 1901.

REPORT ON MR. DRUMMOND DEANE'S GREEN TEAS.

TO THE EDITOR "INDIAN GARDENING AND PLANTING."

DEAR SIR,—We have the pleasure to hand you our report, on your samples from Stagbrook Estate.

(GLAZED) YOUNG HYSON.—Well twisted greenish glazed Pekoe leaf, fair tip, pure pungent flavoury liquor, valuation nominal.

(GLAZED) No. 1 HYSON.—Well curled glazed Orange Pekoe leaf, good tip, pure pungent flavoury liquor, valuation nominal.

IMPERIAL.—Rather flat greenish Pekoe Souchong leaf, pure pungent flavoury liquor, colour of infused leaf is good.

No. 1. HYSON.—Well twisted greenish wiry Pekoe, fair tip, pure pungent flavoury.

YOUNG HYSON.—Very well twisted Pekoe leaf, good tip, pure pungent flavoury.

(GLOSSED) IMPERIAL.—Flat greenish Pekoe Souchong, leaf pure pungent flavoury, colour of the infused leaf is good.

These are as fine samples as we have seen of true *Namuna* green teas. They have not the appearance of green teas, as manufactured in China, but in our opinion, it is a matter of future experience whether the American market will take such teas on their merits in preference to teas made on the old fashioned China methods. The only way to arrive at this is by selling an invoice in America, and we are confident such pure liquoring teas would meet with a favourable reception. MORAN AND CO.

3, Mango Lane; Calcutta 9th Jan. 1901.

TEA-GROWING IN HUNGARY.

The example of Russia has inspired Austria-Hungary with a belief that she can "grow her own tea." On the initiative of Count Zichy, who recently returned from a tour through Asia, the Hungarian Minister of Agriculture ordered that trials should be made in various parts of the country with tea plantations. With this in view, large quantities of seeds, together with about one thousand tea plants, were imported from Shanghai; but, notwithstanding the utmost care, the plantations have been failures. According to exports, when the selected plants arrived at Fiume, they were more fit for burning than for planting. The Agricultural Department has not yet given up the hope of obtaining favourable results, and has decided to make fresh attempts; for which purpose plants have been brought over from Tiflis. These have been distributed throughout Hungary to the State nurseries. —*Planting Opinion.*

CARDAMOMS IN INDIA.

A report by Mr. J. W. Mollison, Deputy Director of Agriculture, Poona, according to an Indian contemporary, claims the cardamom plant to be indigenous to Western and Southern India. It is found in abundance in Kanara, Mysore, and Travancore, and as here, affects rich, moist, forest soils—the essential conditions for successful cultivation being "a soil of loam or clay loam consistence, kept moist by favourable position, but not wet at all seasons; and the garden should by

its natural situation be protected from strong winds, and shade trees should be provided." We suppose there is nothing new in this description; and Ceylon Planters have little to learn from it, and must only wish that they could always command the above conditions. They have, however, succeeded with much less, though always appreciating sheltered nooks and shady ravines for the cultivation. The cardamom is not a product about which much is written now-a days. Its cultivation and preparation do not call for much skill; and those who are in it prefer to keep their own counsel, with their profits! Outside our Executive Council, it would be difficult to find ten men who think that the product is, in any sense, in the experimental stage. Still, it is interesting to learn that in Kanara the crop is chiefly raised from seed, while elsewhere the rhizomes used for propagation are subdivided and planted with their leaves attached in 18 inch pits filled with leaf mould. Little guidance is obtained from the statement that a well-grown plant yields up to half-a-pound of dry cardamoms, as we know what such statements mean with coffee, or any other shrub or tree. It is the average yield which decides the profit and not any exceptional feature.

The statement, however, that the cultivation of cardamoms is attended with considerable risk, is one which it is well to bring to the notice of our readers, as prevention is always better than cure, and precautions against disease to which all plant life is liable can be taken without feeling or causing alarm. Our readers will please note that: "In most of the Kanara gardens a so called disease has appeared in the cardamom crops and is restricting cultivation. The affected plants do not present any particular indications of disease, but simply do not thrive. The leaves in parts become yellow and wither. The effect is that the plants have no vigor of growth. It may be taken as certain that the cardamom, like any other cultivated plant, degenerates when grown for long periods under precisely the same conditions of soil and climate and without any change in methods of propagation or reproduction. The vigour of any cultivated plant may be renewed from time to time by change of soil, change of seed, by rotation of crops and by other regenerating influences. The Kanara cardamom crops have for a long period been grown without any changes in the system of manuring, propagation, and general cultivation, and Mr. Mollison is of opinion that the diseased conditions referred to have been induced by these causes. However, within recent years, borers and grubs have caused considerable damage to the cardamom crops, and the cultivators assert as a reason, that they have been prevented by forest conservation from using for leaf-mould the leaves and twigs of certain trees containing astringent properties and incapable of harbouring insect life. It is of interest to note that snakes and rats are particularly fond of the fruit of the cardamom plant." And so are porcupine and Kandyan villagers!

RUBBER.

SUMATRA RUBBER.—I have received a circular from the Tandjong Kassau Estate in Sumatra, giving particulars of the cultivation of rubber on the Bander Betsy Estate. This estate is situated next to that of the Russian American India-rubber Company, and a large number of Ficus Elastica trees have already been planted. Samples of the rubber already obtained can be had from Mr. J. Poc, Almaar, Holland.

RUBBER, IN JAVA.—A meeting of coffee planters has been held at Malong, in Java. A German scientist addressed the meeting upon the subject of rubber cultivation, and admitted that it would hardly pay on a large scale; but mentioned that a factory had been started in Singapore for preparing gutta from leaves on the Ledeboer system. One of the planters at the meeting, however, stated that the company had failed to raise the capital for the scheme, and that no share had been taken.

RUBBBER IN GAMBIA.—The report of the Administrator of Gambia for the past year gives a highly favourable description of the conditions of the colony. The revenue was £46,840, and was the largest on record, while the expenditure was £30,405, so that at the end of the year the accumulated surplus was £43,490. There is a large decrease in the exports of rubber on account of the practical extinction of the rubber plants by ignorant persons who wander about rubber-cutting in the bush.

RUBBER IN WEST AFRICA.—Under the auspices of the African Section of the Liverpool Chamber of Commerce Mr. P. Hitchens, forest inspector Southern Nigeria, read an address at the Sale Room, Exchange Buildings, Liverpool, on the 3rd instant, on the district of West Africa, known as Benin City Territories. In the middle delta there are palm oil trees, cane, etc. In the upper regions there were no forests—there were grass lands, and here and there were to be found patches of rubber trees. In the middle belt also gutta-percha trees had been found, and next year he hoped large quantities would be shipped from the ports near to the Benin City Territories. Having explained the method of tapping rubber trees and the means taken to preserve the trees from destruction, he said that seeds of rubber trees had been planted along four hundred and fifty miles of road and the seedlings were now growing, and would ultimately grow four deep along this length of roadway. The value of the yield at 2s per pound would be about £140,800. This plan would, he thought, solve the problem of the reafforestation of West Africa.—From *India-Rubber Trades' Journal.* Dec. 10.

SNIPE IN BANGKOK.

Let others talk of the glories of grouse and indulge in rapturous talk about the purple heather, and all other delights of Highland shooting. We are satisfied for the nonce with the bonny little snipe. Imagine the holy calm that reigns on a Siamese landscape as the sun, for a few short minutes heralded by the grey dawn, gilds the smiling fields of green rice and the tops of the palms and feathery bamboos. The air is fresh and bracing, and the matutinal cup of coffee and modicum of fruit are eagerly welcomed. Brilliant drops of dew like rare jewels deck every blade of grass and giant-leaved shrub; and these brushed by the sportsman's nether garments from the knee-high verdure strike with an icy chill [illegible] to the skin. No time is lost in sallying forth and before a dozen steps are taken into the paddy the first brown patch, hardly distinguishable in the uncertain light, whirrs up at the sportsman's feet and with a "tweet," "tweet," is soon lost in rapid flight quite oblivious of the ill-directed

storm of pellets that are sent to arrest his retreat. Another few steps and another bird rises and then another, but the eye of the destroyer is too quick for these and a couple of well-directed shots lay them, with wings outstretched, on the water from which they have just risen. The day has now fairly begun and, only diversified with the advent of an occasional land rail, a plump teal, or perchance a gorgeous truncated pheasant, the fun becomes fast and furious and the bright eyed, elegantly marked little snipe plentiful in the hand of the nimble attendant. Indefatigably the work goes in till near noontide when heat and exhaustion call for a halt under some spreading clump of bamboos or peasant's homestead, where, lost in dreamy indolence superinduced by the cool zephyrs rustling through the foliage, the eye wanders over the peaceful picture, the glorious tints of orange, rich brown, and amber. Then, the basket contains the modest lunch, consisting of a little curry, a sandwich and some fruit with a bottle of some innocuous beverage. With such simple fare the true sportsman is content. But a truce to reveries—after an hour's rest he sets forth with renewed vigour until the lengthening shadows remind him of the necessity of returning. Then as the day wanes he can reach home, tired and foot-sore, may be, but feeling brimful of health and spirits, able to do ample justice to his dinner, conscious that he has worked for and shot his game like a man.—*Bankok Times*, Dec. 28.

HOW TO MAKE TEA—AND SELL IT.

A correspondent, writing to a home medical journal, asks how tannin can be eliminated from tea. We presume the inquirer follows the usual method of allowing his view [brew ?] to draw *ad infin.* When will it dawn on tea drinkers that stewing is not the proper method of treating leaf: despite reiterated advice a cup of drinkable tea is yet unattainable in Calcutta, from the can of the peripatetic vendor of *gurum cha* among the *ghariwans* to that dispensed by fair hands across boudoir tables. A tea kiosk at the Eden Gardens in the evening, and the neighbourhood of the Red Road in the morn, might stimulate consumption and teach our tea concocters a lesson. Have our agency houses ever heard of Lockhart's coffee rooms? or are they too genteel?—*Indian Planters' Gazette*, Jan. 12.

COCONUT OIL INDTSTRY OF THE PHILIPPINES.

ALSO SOAP, CANDLES, TANNERIES, AND OTHER INDUSTRIES.

(*Special Correspondence to the New York Reporter.*)

Iloilo, P. I., Oct. 13. 1900.

The new administration of affairs in the Philippine Islands has brought about many new and important changes in the industries of the former unsettled archipelago. This Spaniards always managed to keep the people of the country in such a turmoil that the owners of

THE LARGE COCONUT GROVES,

never considered it safe to operate anything more than miniature oil-producing plant in connection with their immense groves of coconuts. The proprietors of the plantations and the operators of the plant in which the cocounts were pressed for the purpose of securing the oily materials therein, were subjected not only to heavy taxtation, but were constantly in danger of destruction by raiders, looters and incendiaries. Your correspondent has interviewed very many former wealthy owners of immense coconut groves and copra preparing establishments, who are now poor because of various forces of insurgents or revengeful Spaniards who burned the buildings and destroyed the trees. With the advent of the new administration, however, not only is peace assured to these industrial pursuits, but the taxation is not so great as before, and the proprietors have some chance to make a good income from the business. In fact, some of the parties who have recently taken hold of the cocount oil industry in the Philippines are well on the way to success and prosperity. Evidently there is a grand opening here for the investment of capital in the immense tracts of coconut lands that may be found everywhere in the islands. These lands are often without ownership, and when owners appear, they can be bought off at ridiculously low prices. I have seen miles and miles of coconut trees, all flourishing in first-class order, sold at the rate of about $1 per acre.

The coconut lands are in the low and rich soil of the island, of which there is an abundance. The trees grow from 50 to 100 feet high, and the natives can depend upon collecting crops frequently for the purpose of securing the meat of the fruit, the milk, the fiber of the husk, or the copra, the latter being obtained by cutting the meat into pieces and drying it. The oil is gotten by subjecting the meat to pressure as will be noted later. On horseback I have ridden for days along stretches of country in which the coconut groves are closely joined, every tree of full size and bearing considerable fruit without any cultivation at all, for the natives never give any time or attention to the trees, and go near them only to gather the fruits.

The natives

GET AT THE FRUIT

by ascending the tall trees by means of notches cut in the sides. They apparently walk up the trees with ease. Parties engaging in the copra or the coconut oil business in the Philippines make it a point to first hire about ten natives for each grove of from ten to fifteen acres, and these natives are all capable of ascending the trees. They can be secured for ten cents per day. One or two other natives are needed to do a little cultivating and looking after the property.

The process of getting

THE VALUABLE OILS

from the coconuts consists in first procuring the coconuts from the trees. The fruit is made into large piles in the groves and is collected by other natives who operate the bull carts. The nuts are now taken to the bamboo sheds of the groves, and usually an owner of several miles of groves will have the sheds near the centre of all of the groves, and he will there have his office. A number of natives are employed at this point to remove the husks and the husks are by no means wasted, for they are spread in the sun for a few weeks until thoroughly dry, which causes the fiber to open and loosen to such extent as to permit the coconut fibre workers to rip the fibre off and work it into strands for the making of certain native yarns and fabrics. The sale of the husks brings in quite an income yearly. On a few coconut plantations I noticed that the proprietors made quite a side issue by working the fiber themselves, operating several looms weaving fabrics which brought in good profits. After the husks are removed from the coconut the shells are broken and the meat removed by another set of natives, all working for the extremely low price of from ten to fifteen cents per day and doing a good, full day's work at that. Furthermore the natives calculate upon feeding and lodging themselves at this low rate of wages, but a good proportion of their food comes from the coconut meat, of which they are fond. Most of the owners of the large groves also furnish quantities of rice for their help. As to lodging places, the natives drop to the floor or ground wherever they happen to be at dark and sleep

until morning. Some of the workmen have families, and these erect nipa huts in the locality and live there.

After the meat is cut out from the coconuts, it is chopped into bits by hand knives, mechanical devices fitted with rolls and parallelly arranged blades, and spirally fitted knives for accomplishing the same purpose.

THE CUTTING OF THE COCONUT MEAT

involves considerable work, and after it is done right, the meat is spread out in the sun to dry. One may see wide expanses of white surface where this meat is distributed over extensive territory for purposes of drying. The drying is accomplished in a few days, after which the material which is now called commercially "copra," is ready for packing. The copra is usually packed in mats of native make and shipped to Europe, Japan, Russia, and sometimes to America. In nearly all cases the copra is used for manufacture of oils and soaps, although it finds its way into many lines of saleable articles when it arrives at the final markets. Candy makers buy much of it, while bakers and others take certain quantities.

A very large proportion of the cocoanuts and the copra go to waste every season and this wastage is equal to good incomes for someone. The writer has seen hundreds of hogs feeding on the rich coconuts in the groves simply because no one cares enough about the product to collect it. There is many more times greater products of the fruit here than is needed to supply the market at the present time, simply because the local raisers of the fruit and the makers of copra do not provide to furnish the demand. If the purchasing agents of other countries could always rely upon obtaining all of the copra they want in the Philippines, a vasty greater number of orders would be placed than at present. I know of many instances where representatives of foreign purchasing concerns have failed to secure the quantity of copra required by them, and of course this sort of thing tends to turn the market to other islands.

THE COCONUT OIL FACTORY OF THE PHILIPPINES

is fitted ordinarily with very crude machinery of ancient type. The principal piece of machinery is the press. In many cases these presses are only of the old screw pattern with a large worm shaft, and the whole force of natives employed in the vicinity of the works is called upon at the time the big levers are operated for turning the worm shaft. I have noticed as many as thirty men on the lever. They work at the lever for hours, pressing the big platen down on the bits of cocoanut, pressing the last drop of oily matter from the same. In other places, they have steam presses, in which case the work is done in more of a mechanical order and on a much larger scale with considerably less manual labour. The steam presses call for the employment of a steam-power plant, and this is one of the reasons why they are not so extentively used, Recently, however, there have been some turbine and other kinds of water wheels shipped here and the writer has observed that a number of cocoanut oil establishments have adopted these forms of power-producing devices for the operating of the presses. Where they can get a steady run of water, they are assured of good and regular service the entire year. Again in a few instances, where they were not required to operate the presses constantly, they were using windmills, obtaining the power from these. Again I saw that they had animal traction employed at other places. In several of the more up-to-date works they were operating hydraulic presses to good advantage. Some of the Americans, who have taken hold of the industry and who are making rich returns, are using the hydraulic presses. As to taxation, factories in which cocoanut oils are made pay $15 gold per year to the Government. For each hydraulic or steam press $6 is charged in addition. Cocoanut oil refineries pay $15 gold. The collections are made quarterly by the collectors of internal revenue of the islands, there being collectors at every port, and at all important interior cities and towns. At present army officers have charge of the collections. Later on civilians will be in charge.

With the general revival of manufacturing and other

INDUSTRIES OF THE PHILIPPINES,

there has come a good demand for all of the products of the plantations and the shops. Oils are in very good demand for the purposes of lubrication, employment in making soaps, candles, illuminating purposes, and many others. There can hardly be enough coconut oil made here during the next five years to be equal to local demand alone, while the exporting demand has not decreased. The result is that oils are coming in from other countries, and these, too, meet with quick consumption. I have been in localities where for weeks the entire oil business is stranded for lack of any supplies. Prices take big jumps under such circumstances. Taking in rotation the various channels for consumption of coconut oils in the Philippines, for the benefit of Americans or others who are contemplating engaging in what is going to be one of the best money-making industries of the new possessions, we find that the oil lamps consume large quantities annually. The shipments of illuminating oils to the Philippines are chiefly kerosene, and the expense is so high by the time the oil is here that domestic oils are sought for. Therefore, many of the street lights and lights for the churches and public buildings, as well as for houses, are made for burning coconut oil. The main consumption for the oils will be for these lights, and the amount consumed will always be large for the reason that, in addition to ordinary lighting purposes, the natives utilize considerable oil in burning lights steadily at church and home altars, besides in the torches of numerous night religious processions. Wakes and feasts are always in progress, at which the burning of oil is large. The result is that the oil manufacturers of the Philippines are constantly doing a lucrative business.

HEMP

has been one of the staple industries of the Philippines since the beginning of the habitation of the country. Hemp manufacturers now manufacture many lines of twines, threads, cords, and fabrics in which the fiber has received a high gloss by means of employing oiled surfaces in imitation of waxed textures. The oil is applied during the processes of winding and warping the yarns, and many gallons of it are consumed annually in the various textile manufacturing districts. After the oils are applied, the materials are subjected to the friction of brush rolls by which the gloss is further heightened.

THE SOAP MAKERS

of the Philippines manufacture little white slabs of soap for use in washing both clothes and persons. These soaps contain large percentages of coconut oils, and some of the fats of animals. The coconut oil refiners sell much oil to the makers of the so-called fancy soaps, which soaps are really dangerous to use, as the native manufacturers employ some of the dye woods for coloring the soaps, which are poisonous. I visited several soap works where they were combining coconut oils with fats, and at certain stages of the operation pieces of dye woods were strewn in the mass, the dye releasing itself and mixing rapidly with the whitish mass of oil and soap. The color was red in one case, in another yellow, while still another was almost green. Then, after enough color appeared, the dye woods were removed and the soaps finished. The soap makers take very considerable quantities of oils, and with the increased additions to the soap making plants and the erection of new works the demand for coconut oils will be proportionately larger.

THE CANDLE MARKERS OF THE PHILIPPINES

do a thriving business, owing to the great amount of candle material consumed for religious purposes in both churches and homes. There are thousands of families who have lost dear ones and who have erected altars in their houses in memory of the departed, at which series of candles are constantly burning. The candle makers buy the lower grades of coconut oils, and, together with fats and greases, manage to turn out some low-grade candles suitable for the purposes of the islands. The best grades of

wax and sperm candles are sent here from other countries, but they cost too much for general service, and usually the home made, cheap candle is used.

The Philippines have in them a great many more

LEATHER TANNERIES

than strangers suppose. There is a large consumption of leather here for the making of shoes for use on Sundays and feast days. Harness leathers are wanted, and belts, etc. In nearly all of the cities or of the country there are leather tanneries in operation, and these have taken new life since American occupation. Your correspondent visited several of these native tanneries and found that in every case there had been increased orders, and that it was the intention to add more machinery and increase the capacity of the work. The native tanners find an abundance of tanning material in the country, and this comes cheap to them. They also use considerable fats and oils in the finishing processes for softening the fibre of the leather and in getting the necessary glossy finish. Since they have tried to make leather belting for the power plants of the islands, considerable oily substance has been called for. The natives formerly turned out belting so stiff and harsh that few would buy it, preferring to pay ten times higher prices for the imported belting that would work well on pulleys. But among the discharged soldiers of the United States Army there were some who were formerly tanners, and these men have seen the money to be made in the business, and they have interested themselves with the native owners, with the result that the belting turned out by the native tanneries is now suitable for the transmission of power on frictional surfaces of pulleys.

It has become a general custom in the Phillippines to always calculate upon certain important portions of articles shipped here from other countries to be missing. Paints have been shipped here from American and other nations in vast lots during the past year, but the necessary oils are often absent, with the result that the native painter uses any available oil. I have seen these native painters dump quantities of coconut-oil into colors so as to thin the colors and make them go over more surface. The oils prevent the drying of the colours for a long time, but no one minds this. The painters of the islands are good customers of the oils, and the coconut oil makers have no difficulty in selling their products, and the chances for additional manufacturers are good.

Americans or others who would engage in the making of coconut oils in the Philippines should calculate upon securing the entire plant for the oil manufacture in America, as there are no presses or refining apparatus here. One can buy the engine here, also the vats, pumps, belting and small devices. All other equipments should be purchased ahead and sent here. The necessary labor can be secured in the immediate vicinity. I know of several Americans who are sitting back in their carriages and riding about, while their newly purchased oil works are paying handsome profits under the superintendence of a Filipino oil manufacturer at wages equal to about $1 gold per day, and a very small commission on profits. This superintendent hires several overseers of departments at 40 to 50 cents per day and no commission, and the overseers get all the labor they want at from 10 to 15 cents per day. The coconuts can be raised or bought outright, or the copra can be purchased ready to crush and refine. There is certainly money in this business now that the soldiers of the islands afford the necessary protection to industries. If need be, soldiers will be provided to guard outlying works.—*Oil Paint and Drug Reporter.*

THE TEA TRADE IN 1900.

In its review of tea for the past year the *Grocer* has the following:—

CEYLON TEA.

This market, as regards priced teas, is ruled by the Indian market, but fine quality Pekoes and all leaf teas suitable for export have a market of their own, more or less, while fine broken Pekoes move up and down 3d and 4d per lb. throughout the year as quality improves or falls off. The enormous extra supply, however, for the first five months of the year greatly added to the collapse of the common tea market. From January 1, 1900, to May 31 we received 11¼ million lb. more than in 1899 to same date, while for the year we shall receive about 112 million lb. against 96¼ million lb in 1899, making a total increase of between 15 and 16 million lb. Deliveries, however, head the list in increases, and are most satisfactory—viz, 11 million lb, or say 105 million lb, against 94¼ million lb in 1899. We have, however, added on to our stock about 6 million lb, and, as we said in our remarks on Indian tea, the outlook for the new year is not a bright one when we consider that India and Ceylon together will add some 17 million lb on to the stock by January 1, 1901. We can only hope that the present ruinous rates will help to curtail any extra supplies we might otherwise get from our "spicy colony." Re-exports are accountable for 1¾ million lb of the increased deliveries. The quality of this year's supplies has been a fair average. The average prices of the fine liquoring leaf teas and brokens until August were decidedly under previous seasons, but since then values have improved considerably, the trade having competed for them, owing, no doubt, to the poor value offering in Indian teas between 8d and 1s per lb. In previous years Russian orders were generally 2d per lb over trade ideas, but of late we find the latter have been willing to take them at even more money. The market opened in January with a very strong tone and a quotation of 6¼d to 6½d for leaf, but prices before the end of the month gave way for the lower grades, and showed small ups and downs for several months, while the better teas rose until May or June. Sweet common broken Pekoes were a feature at 5¼d to 6d, and have remained low for the rest of the year, with a rise of ½d per lb about July, only to fall away again later on. In July-August we find quotations of 5d for leaf, and since then there has been a more or less falling market for common kinds until we reached 4¼d and 4¾d for fair leaf teas, and 5¼d to 6d for sweet broken Pekoes. The quality of fine teas was very good in October, and long prices were, and are, being realised. Choice teas have been scarce throughout the year, but as we write we find that the lower grades are nearly 2d per lb cheaper than they were at the end of 1899.

The exports for 1900 from Colombo direct to other countries than the United Kingdom will be about 32 million lb, Russia being credited with nearly 9 million lb, or an increase of more than 5 million lb over 1899; while America and Australia both taken 1 million lb extra.—*Home and Colonial Mail,* Jan. 4.

ARTIFICIAL MANURES.—The *Englishman* understands that a scheme is under consideration for the starting of a company having for its object the manufacture in India of artificial manures. This movement has had its origin in the important part that scientific methods of manuring have been found to play in improving the quality and increasing the yield of indigo.—*Pioneer,* Jan. 7.

Correspondence.

To the Editor.

TAX ON TEA.

[*To the Editor*, "HOME AND COLONIAL MAIL."]

SIR,—Tea is essentially the beverage of the masses—it refreshes, invigorates, and stimulates, without if properly brewed, possessing any baneful properties; and it has come into such universal use amongst all classes that it can no longer be looked upon as a luxury, but must be treated as an actual necessity to every man, woman, and child in Great Britain; and yet the policy of our Government has always been to do its utmost to restrict the use of tea by taxing it to a greater degree than any other necessary article of food or drink imported into our islands.

This tax at present amounts to fully cent. per cent upon seven-eighths of the tea we drink,—*i.e.* tea that is sold at 6d per lb in Mincing Lane has to pay a tax of another 6d per lb before it can reach the grocers, and in gross it yields a yearly total of fully £6,000,000, to the Exchequer.

Now your ordinary readers will say that this subject does not affect them, inasmuch as the price of tea retailed to the public has steadily declined of late years, and this in spite of the addition of 2d to the tax made in the spring of last year.

This, indeed, is the case at the present moment; but it cannot and will not last for, as, of course, is not generally known, although none the less an absolute fact, the entire sum produced by the additional tax has come out of the pockets of the unfortunate tea-growers and producers (who for some years past have been working with a very small margin of profit). The result is that much more than half the tea now imported is selling in Mincing Lane considerably below the cost of production, and tea-growers are being ruined. The end is not far to seek—tea plantations or gardens, as we call them, cannot be carried on at a loss and many, if not most, of them will be closed altogether, thus throwing numberless poor natives and many of our own countrymen out of employment in India and Ceylon; shareholders will be ruined, and the total production will be naturally reduced, with the inevitable consequence that prices will rise again, and the English working man will have to pay probably half as much again for his cup of tea, or go without it altogether. The Government will find, when it is too late, that it has been killing the goose that has been laying the golden eggs, as it will have a very considerably reduced total upon which to levy its unjust tax, and then the only way in which it can recoup itself will be by raising the tax to 9d or 1s, which would in the course of a short time stamp out the industry altogether.

The above is no exaggerated picture, but a plain, bare statement of facts, and of what must inevitably come about unless the masses of the tea-drinking English public bestir themselves, and insist upon this most shameful and oppressive tax being at once very materially reduced, if not removed altogether.

Time was when we heard the cry of a "free breakfast table"; and we might yet have distant visions of this proof of the freedom and prosperity of our country, if every tea drinker in England, Scotland, and Ireland, would raise a protest against this crying injustice; and even if necessary make it a party cry. For myself, staunch Conservative as I have been all my life, and had hoped to remain, I would be strongly tempted to vote Liberal at the next election if, failing our present Government, the Liberals would promise to redress this evil before it is too late.

I have spent the best part of my life in growing and making tea, and, if you will believe me, really know something about the subject I have tried to treat of. Everything connected with the tea industry is very dear to me, and it was never in such dire distress before. This is chiefly due to the imposition of that extra 2d on the tax last March. That, at least, was the last straw, and unless relief comes quickly the great Indian tea industry will before long have become in a great measure a thing of the past.

I enclose my card, and remain, yours faithfully,

J. S. H.

London, Dec. 30, 1900.

TEA AND "MANURO-PHOBIA."

Jan. 15.

DEAR SIR,—How prejudice can blind one to reason, is finely illustrated in Mr. N. C. Davidson's letter which you published in last night's paper. He has made up his mind against Mr. Rosling's proposal, and bases his opposition to it on the ground that those who have not helped over-production by forcing manures, should not be called upon to suffer for the benefit of those who have, he thinks, brought about all the trouble. I do not say that Mr. Rosling's is a scheme on which there cannot be two opinions; but it does *not* call for any self sacrifice, as he clearly showed. On the contrary, if his expectations are fulfilled, it is the high estates which will benefit more than those in the low-country from enhanced prices.

Over-production is a fact; but what is the warrant for the assumption, on which Mr. Davidson builds his opposition—that it is forcing manures which have caused over-production? It is only within the last three or four years at most that forcing manures are alleged to have been used. Assuming the truth of the allegation, what have they forced the bushes to in four years? The exports have increased from 116 million lb. of tea in 1897 to 148 millions in 1900. Is a progressive increase of 32 million lb. in four years anything out of the way, simply allowing for the development of young bushes over about 60,000 to 70,000 acres, to say nothing of extensions? Apply another test, do 148 million lb. represent an excessive yield for about 400,000 acres under tea? It works out an average of only 370 lb. an acre. The theory of forcing manures cannot be supported by statistics. It is a chimera of those who have forcing manures on the brain, and who do not understand manuring with brains. There may be a few hundred, or even a few thousand, acres which have been forced. Others have had only just and liberal treatment to keep the bushes in heart, but for which the acreage abandoned and the drop in exports would have ruined hundreds of stout and willing men.

LIVE AND LET LIVE.

PER CONTRA.

Amherst, Udapussellawa, Jan. 16.

Sir,—In the footnote to my letter (*vide* local "Times" of 14th) it is said that very little manuring of any sort is done in India, and that forcing manures are practically unknown there. If this is the case it only strengthens my argument, as it is quite absurd to think that India will join us in the abandonment of 10 per cent. of bearing tea as long as we go on glutting the market with artificial aids. Why don't people who are crying out against the Over-production, put it down to its real cause, viz., *manure.* I know estates at high elevations (4,800 ft. to 5,000 ft.) that have nearly doubled their yield from fields that would give 450 lb. to 500 lb. naturally and, *pace* Mr. W. D. Bosanquet, there are very few estates that have reached the stage of manuring half every year *of their whole bearing acreage.* A few may be doing so, and they are more than anything else the curse of Ceylon and the tea industry. Mr. Kelway Bamber in his pamphlet page 74 says: "There is little doubt that the present crop of Ceylon could be increased by ⅓ or more, and this without the employment of very expensive, though somewhat stimulating, manures. But prices would drop, &c., &c." With estates at liberty to use manure *ad lib*, the mere fact of abandoning 10 per cent. of our acreage will have absolutely no effect on the present output and we should be worse off than ever. I would suggest:—

1. Put a stop to manuring by a prohibitive duty. *Then* abandon 10 per cent. if necessary.
2. Get Ceylon and Indian Governments to put a stop to further increase of area under tea—Yours, &c.,

NORTH C. DAVIDSON.

THE SILVER OAK—A QUERY.

Delta, Pussellawa, 19th Jan., 1901.

Dear Sir,—Can you give me any information about the silver oak? Is it a quick-growing fuel tree or merely ornamental and about what size does it grow? Yours faithfully,

A. L. F.

[In a list of over fifty kinds of oak with popular English names, we cannot find "the Silver Oak." Does our correspondent mean 'the silky oak" of Queensland, which is the well-known *grevillea robusta* that ought to, and no doubt does, grow rapidly to be a very large tree in the delightful climate and soil of Pussellawa? There is besides the "silver tree" (Leucadendron argenteum) or "Witteboom" of Cape Colonists; but it is a small shrub useful for fuel.—Ed. *T.A.*]

OVER-PRODUCTION AND THE REMEDY.

Jan. 23.

Sir,—Mr. Rosling's proposal, which I have written in support of, is certainly not put forward from the altruistic point of view, nor does it ask anyone to give away a part of his profit for someone else's benefit, or it would deservedly earn Mr. Wiggin's title of "Puerile." The essence of the proposal is that the letting of 10 per cent of the acreage of India and Ceylon run unplucked, will reduce the output of tea by 25 million lb., and that 25 million lb., taken off the market, will raise the price of tea 1d per lb. Granted the correctness of the above premises, and the rest is capable of proof, and each estate can work out the result for itself. 25 million lb. is about seven per cent, of the probable yield for 1901. I give a few examples of how the plan would work and each estate can correct the figures in the light of its own estimate. My own belief is that the high estates would benefit more than the low, and that the rise in teas of high quality would be more probably 1½d per lb., as their loss would be more felt in the market.—Yours etc., faithfully,

WILLIAM D. BOSANQUET.

Take 3 average estates of 500 acres giving at present 500 lb. of tea per acre at three elevations.

HIGH ESTATE.

500 lb. per acre at 9d nett or 54cts=250,000 lb ...	=R135,000
Expenditure, at 30cts per lb. ...	=R 75,000
Profit ...	R 60,000
50 acres at 400 lb. per acre taken out=20,000 lb. 230,000 lb. of tea at 10d nett of 60cts ...	=R138,000
Expenditure, less saving on 50 acres R5,000 ...	=R 70,000
Profit ...	R 68,000

MEDIUM ESTATE.

500 lb. per acre at 6½d nett or 39cts=250,000 lb. ...	=R 97,500
Expenditure, at 26cts per lb. ...	=R 65,000
Profit ...	R 32,000
50 acres at 300 lb. per acre taken out=15,000 lb.; 235,000 lb. of tea at 7½d nett or 45cts ...	=R105,750
Expenditure, less saving on 50 acres	=R 62,000
Profit ...	R 43,750

LOW ESTATE.

500 lb. per acre at 4½d nett or 27 cts =250,000 lb.	=R 67,500
Expenditure at 22 cts per lb. ...	=R 55,000
Profit ...	R 12,500
50 acres at 300 lb. per acre taken out =15,000 lb. 235,000 lb. of tea at 5½d nett or 33 cts	=R 77,550
Expenditure, less saving on 50 acres	=R 53,000
Profit ...	R 24,559

FINALLY TAKE THE BEST ESATE I KNOW.

500 acres at 800 lb. per acre at 8½d or 51 cts	=R204,000
Expenditure, at 24 cts per lb. ...	=R 96,000
Profit ...	R108,000
450 acres at 800 lb.=360,000 lb. at 9½d or 57 cts	=R205,200
Expenditure, less saving on 50 acres,	=R 90,000
Profit ...	R115,200

The figures are, of course, only approximate.

W.D.B.

II.

Amherst, Udapussellawa, Jan. 23.

SIR,—In a controversy such as is going on, the subject of over-production and its remedies, I am surprised at your admitting remarks like those contained in the first two paras of Mr. A R Wiggin's letter.* They might easily have been deleted. Abuse is no argument, and I do not suppose you are going to add a new suggested remedy to your list, viz., "abuse those who have been deservedly elected as leaders by a plebiscite of planters."

I was one of the first to write in opposition to the Rosling-Rutherford scheme, but I trust I have more sense and better taste than to consider everyone who disagree with me or with whom I disagree, "puerile" and "brainless."

To turn to the object in view:—There is no reason to suppose that India will co-operate with Ceylon in any "curtailments of output" as long as Ceylon goes on using artificial aids to increase her yield, which India does not employ. Mr. Talbot's scheme does not suggest any "curtailment of output," but "an expansion of markets," and is sure to be much more popular than any scheme that means self-sacrifice. I presume that he does not mean that we are to *give* away 5 per cent. of our green, and 5 per cent. of our black, teas. The Indian planters should take the matter up. If there is no caste prejudice against drinking our teas, there must be a vast untouched market in the Indian towns for black teas; and in Afghanistan, Thibet, &c., for green teas, as the Afghans and Thibetans seem to be great green-tea drinkers.

Is it a fact that tippings make as good green teas as leaf longer from pruning? If so, surely it would pay green tea factories to buy tippings from their neighbours at prices that would be profitable to both producer and manufacturer. This alone would reduce the black tea output considerably and improve the quality of the tea at the same time; but I may have been misled on this point, as I have had no practical experience in green-tea making.—Yours, &c., NORTH C. DAVIDSON.

ARTIFICIAL MANURES POISONING VEGETABLES.

Kandy, Jan. 22.

DEAR SIR,—With reference to your extract in *Ceylon Observer*, Jan. 21st, entitled "Suggested Danger from Artificial Manures," I beg to inform you that cabbages and turnips, manured with superphosphates, are surely poisonous; and I estimate the quantity of cabbages or turnips which should empoison a man to be at least *one ton* daily.—I am, dear sir, yours faithfully,

DR. F. W. KOELER.

VEGETABLE SOAP.—There are several trees and plants in the world whose berries, juice, or bark, are as good to wash with as real soap. In the West Indian Islands and in South America (says the "Family Doctor") grows a tree whose fruit makes an excellent lather and is used for washing clothes. The bark of a tree which grows in Peru, and of another which grows in the Malay Islands, yields a fine soap. The common soapwort, which is indigenous to England, is so full of saponine that simply rubbing the leaves together in water produces a soapy lather.

* The letter was signed in full by a responsible colonist: had it been anonymous the case would be different.—ED. *T.A*,

IN DAYS OF OLD.

(By an ex-Colombo "O.B.C.-ekere.")

Sitting by the "ingle neuk" in a long dreary, murky nicht in Auld Scotland, one's thoughts often turn to far off Ceylon, where the best of my years were spent, and an intense yearning for another glimpse of that lovely land creeps in upon one's soul as he recalls the many sporting adventures he had the pleasure to take part in with the many good old friends of his youth, who are, alas, no more!

The writer's earliest experience of

ELK HUNTING

was in 1868 with the late John McLeod while Superintendent of Kadianlena, and to him I was indebted for my first visit to a planter's bungalow in Ceylon.

On arriving from Colombo, it is unnecessary to say, I was received with that open hospitality and kindness, which were in those days extended to every stranger visiting them, by the planters of Ceylon. Their open-heartedness was proverbial then, and, I believe, continues to be so up to this very day. Reclining in a long-arm chair in the verandah after a good dinner, and while enjoying a well-seasoned "Trichi," I can remember becoming much excited by the distant eerie cry of a pack of jackals as they began their nightly round of the Baharundrah slopes, hunting no doubt some unfortunate "moosul," and as their screeching became louder and louder, and the pack came close down through the coffee to within a few hundred yards of where we sat, it took my friend some considerable trouble to check my youthful and ardent desire to be up and join in the hunt, for I recollect it was a lovely moonlight night. Mine host having informed me, however, that he was going to show me another kind of sport on the following morning, and that we should require to be early on the move, I was reconciled to return to my comfortable lounger, finish my smoke with the usual accompaniment, a "peg" of good old Scotch, thereafter to "roost" and dream of the morrow's chine.

We were afloat before daybreak, and, when light dawned, well on our way, with a nice little level pack of hounds to the spot selected for our hunt. Young and vigorous as I was in those days, I soon found out that I was not in good enough training, once the hounds found, to keep within hail of them for any distance. All I can remember at this period is that, after going a couple of miles over beautiful patana land and through stiff jungle, I was quite out-distanced by McLeod and the dog-boys, and left so hopelessly in the rear that I had to succumb and seek mother earth with "bellows no end to mend." How long I lay on the patanas I cannot say, but it seemed hours before the huntsmen and pack returned with a handsome buck elk carried by coolies in the usual manner; and, though I had not the pleasure of being in at the death, I saw and had recounted to me enough of elk hunting to satisfy me that it was about the finest sport extant.

HOW I KILLED MY FIRST AND ONLY SPIKED BUCK.

A goodly number of years had come and gone, and in the interval I had taken part in some very fine runs in and around Nuwara Eliya with the late G A Cruwell, R B Downall, W W Wynn, &c., when in 1875, or 1876, a couple of those gentlemen and the writer received a very cordial invitation from

THE LATE LAIRD OF MATTAKELLE

—than whom there was no grander old huntsman at that time in Ceylon—to have a day with his celebrated pack in Dimbula. Well do I recall that (to me) memorable morning when we turned out on to the large stretch of patanas lying at the back of Mattakelle bungalow. A bright crisp morning in November after the monsoon rains had refreshed all Nature, and "Old King Coffee" looked as if the heyday of its prosperity would never decay—at least over that grand expanse of Dimbula lying betwixt us and the Great Western range—and I had no misgivings then as to the assured fortune of our genial and kindly host—the biggest-hearted soul I ever met. How a few short years changed the circumstances of many hardy, honest, prosperous planters in those days, it would be useless for me to recount in this letter, so I will "hie back" to the subject of my text. In the days of which I write nearly the whole of Dimbula, at least as far up as Radella, was under coffee and there was little jungle to be seen, big enough to hold game. About the far end of the patanas to which I have referred, however, there was a conical hill of forest standing. I should at a rough estimate put it down at 100 to 150 acres, though we could only see the side facing the plains. Into this the hounds were slipped by the "dog boys," while the huntsman, Cruwell, Wynn and the writer squatted on the grass to await results. The Master knowing so well the habits of the elk assured us that when the hounds succeeded in forcing him to vacate his stronghold, the "quarry" would break cover and take to the open on the side commanded by us.

HUNTING THE QUARRY.

"The Laird" had that time in his kennels a magnificent specimen of the greyhound, a half-brother to the famous Irish dog of that breed, "Master McGrath," a triple winner, I believe, for the late Lord Lurgan of the Waterloo Cup at Liverpool. This hound was in leash and delivered over to my care. How long we waited on those patanas, listening to the distant "tonguing" of the pack as they hunted their quarry round and round that jungle, the voices of the hounds every now and then being heard as they approached the ridge and then becoming quiet again as they descended on the other side—it is impossible exactly to say. Keener huntsmen than the trio who accompanied me it would be difficult to find, and yet when 9 o'clock arrived, and seemingly no prospect of any excitement, either their patience became exhausted, or more likely the cravings of hunger led them to make tracks for Mattakelle; for off they went and left me single-handed with only the grey-hound as a companion. I had not very long to wait before the virtue of patience was rewarded. From the far-off corner of the jungle I could see the elk break cover, and come bounding down over those vast and rugged patanas with a couple of small half-bred hounds hanging on to his ears, and in the very direction wished for and exactly as indicated by our huntsman before he left me.

Making the best use I could of my "understandings", and pulled along at a tremendous pace by the straining power of the hound whom I was loath to slip until he had fairly sighted the game, I came almost to mortal grief over a cut drain in the middle of the plain, which was hidden by tall rushes. Unaware of this wretched "man-trap" and going at such speed I tripped over the upheaved earth and stones, and landing full length I came a cropper on some broken metal on the far side, and though clad in a stout pair of English corded "knickers," I received a very severe cut close upon the knee cap (the mark of which I carry to this day) and I was thereafter only able to crawl to where the elk was held at bay by the assistance of the greyhound.

THE "COUP DE GRACE"

followed, and do not wish ever again to hear that "uncanny" cry when my blade struck his heart and he bounded high up into the air, falling dead at my feet. He turned out to be a magnificent specimen of the Spiked Buck very rare in those days in Ceylon. The head was mounted and adorned Mattakelle bungalow along with so many other trophies of the chase; but I was promised that it should eventually find a place in my own house whenever I had the good fortune to settle down in this country; and one of the very latest letters I had from my late noble friend was to the effect that the head of my Spiked Buck would be sent to Scotland by an early opportunity. But it has never reached me.

To finish my story, Making tracks for the bungalow, as best I could in my crippled state, I had not proceeded far, before

ANOTHER DANGER

lay in my path for my attention was soon drawn to the presence of three semi-wild buffaloes who came trotting along in our direction with up-raised heads looking as savage as only those brutes can look when raised. A means of concealment fortunately was close at hand, and into an open drain I dropped unperceived, dragging my greyhound on the top of me, and with deep feelings of relief allowed these creatures to pass to leeward within about 30 yards of where we lay, and move out of sight. When I did manage to reach Mattakelle, exhausted with pain, I received much kind attention from Dr. D—then resident Surgeon of the district—and who I am glad to know is still in Ceylon. By his orders I was laid up for several days; thereafter when convalescent travelling on to Kandy where I was due to take part in an important Cricket match,—Colombo *vs.* Planters. Thus ended the most enjoyable holiday I ever had in the Island of Ceylon.

"W. G."

BIG GAME IN THE SOUDAN.

A PRICE PLACED ON EVERY HEAD TO BE SHOT AT.

Cairo, Dec 31.—The Soudanese Government, having received numerous applications from notable sportsmen to hunt and shoot big game in the Soudan, have decided to afford sportsmen the desired facilities under certain restrictions. Licences to kill big game will be granted at the following rates :—£25 will entitle a sportsman to kill four buffaloes, two elephants, one giraffe, six hippopotami, two rhinoceroses, antelopes, gazelles, and wart-hogs; in addition to which, for some animals killed a fee is charged—for a buffalo £6, an elephant £8, a giraffe £6, a hippopotamus £1, and a rhinoceros £5. A £5 licence entitles a sportsman to shoot antelopes, gazelles, and wart-hog. In addition to the fees mentioned the duty on ivory has to be paid.

These regulations have been instituted by the military authorities for the purpose of preserving big game, which is plentiful in the Soudan, from wanton destruction. Some of the rare species of antelope will also be protected in an edict shortly to be issued by the Soudanese Government.

Captain Charteris is here, and has made arrangements with the military authorities for a party of sportsmen to hunt and shoot over the territory bordering the Blue Nile. Mr. E N Buxton, a noted English sportsman, is also here, and is arranging a shooting expedition.—*Daily Express.*

COCA.—*Erythroxylon coca.*—It has been ascertained by practical test made in our experimental garden that the coca plant cannot be grown successfully in Madras unless it is partially shaded. Plants put out in the open did not thrive; they grew, but were stunted in appearance, and the leaves were small and scanty; on the other hand, plants grown directly under the shade of a tree, although they grew to the height of 5 feet and looked otherwise in a healthy condition, failed to produce fruit, while plants grown in partial shade grew luxuriantly and bore fruit that ripened in due course.—*Agri-Horticultural Society of Madras.*

RAINFALL RETURN FOR COLOMBO.

(*Supplied by the Surveyor-General.*)

	1896.	1897.	1898.	1899.	1900	Av of 31yrs.	1901
	Inch	Inch	Inch	Inch.	Inch.	Inch.	Inch.
January ..	2·92	3·81	2·32	6·98	3·72	3·24	11·91
February ..	0·35	1·68	1·98	2·78	0·63	1·89	0 37*
March ..	5·64	3·66	4·21	0·88	3·71	4·75	
April ..	5·93	10·97	22·81	6·66	15·12	11·43	
May ..	9·31	8·30	5·80	17·73	10·63	12·04	
June ..	8·37	10·14	10·94	9·23	7·83	8·35	
July	2·85	5·24	6·15	1·11	6·77	4·30	
August ..	6·35	9·09	0·97	0·62	7·35	3·79	
September	10·99	4·58	6·90	1·43	4·00	4·98	
October ..	16·78	4·71	20·60	12 99	9·47	14·[illegible]6	
November..	19.81	11·66	17·38	8·58	9·25	12·[illegible]5	
December..	11·76	8·89	3·05	4·44	5·20	6·35	
Total..	101·06	82·73	103·11	73·48	83·68	88·03	12·28*

* From 1st to 6th Feb. 0·37 inches, that is up to 9-30 a.m. on the 7th Feb.—ED. *C.O.*]

Ceylon Rainfall.

THE P. W. D. METEOROLOGICAL OBSERVATIONS FOR DEC 1900.—We append the Monthly Return of rain from which it will be seen that the highest fall in Dec. was at Manalpuddy in the Eastern Province 48·06 inches, and the lowest at Mylapitiya in the Central Province, 1·01 inches.

WESTERN PROVINCE.

Negombo, Mr. Bucknall (6) .. 5·82
Kalutara Mr. Emerson (36) ... 9 74
Labugama, Mr. Bond (369) .. 11·11
Henaratgoda, Mr. Silva (33) .. 5·75

CENTRAL PROVINCE.

Katugastota, Mr. Morgan (1,500) .. 2·51
New Valley, (Dikoya) Mr. Wa d-ll (3,700) ... 3 71
He'boda (Pussellawa) Mr. Gosset (3,500) .. 7·57
Yarrow estate, .. Mr. Padwick (3,400) 9·61
Peradeniya Mr. Macmillan (1,540) 7·20
Duckwari, Mr. Edwin (3,300) .. 5·74
Caledonia, Mr. Shand (4,273) 6·77
Pussellawa. Mr. Powell (3,000) .. 7·89
Hakgala, Mr. .. Nock (5,581) .. 11·61
S. Wanarajah Estate Mr. Tatham (3,700 ... 6 19
Padupola, Mr. Waddel (1,636) ... 9 45
Mylapitiya, Mr. Fletcher (1,767) .. 1·01
Aluta — —

NORTHERN PROVINCE.

Mullaittivu, Not received (12) —
Jaffna Mr. Macdonnell (8) 7·76
Mankulam, (N. Road) Mr Ebert (167) .. 15·25
Elephant Pass, Mr ... Silva (7) .. 11·34
Vangalachettykulam, Mr. Oorloff (179) ... 8·50
Point Pedro, Mr. Chita[illegible]alam (24) .. 6 74
Jaffna College, Mr. Hastings (9) .. 10·40
Kayts, Mr. Kretser (8) .. 10·17
Kankesanturai, Mr. Pararachasinghe (10) ... 8·98
Pallai, Mr. Silva (24) .. 11·17
Murlkandy, (North-Central Road) Mr. Silva (7) 28·53
Nedunkeni, Mr. Ebert (122) ... 17·79
Chavakachcheri, Mr. Silva (16) .. 5·54
Udupiddi, Mr. Brown (?5) . 8 18
Marichchukaddi, Mr. Tampue (14) 3·84
Murunkan, Not received (52) —
Vavuniya, Mr. Ebert (318) 7 10

SOUTHERN PROVINCE.

Ella Vella, Mr. Caldicott (262) 10·26
Kekanadura, do (150) 3·87
Denagama, do (286) 8·14
U[illegible]kiriwila Mr. Lourensz (235) .. 4·[illegible]4
Kirama, Mr. Lorensz (260) 7·32
Haliela Mr. Caldicott (200) 11·85
Tissa, Mr. Silva (75) 1 02
Matara, Mr. Caldicott (15) .. 3·93
Dandeniya, do (157) 7·C4
Urubokka, Mr. Caldicott (890) 15·07
Tangalla Mr. Russell (94) 2·21
Mamadola, Mr. Doole (56) .. 4·57

EASTERN PROVINCE.

Irrakkamam, Mr. Bower (42) ... 12·78
Devilana, Mr. Vanderstraaten (136) 6·98
Sagamata, Mr. Bower (40) ... 10·65
Ambare, do (65) 14·24
Kanthalai, Mr. Carte (150) 5·10
Allai, Mr. Carte (95) 10·78
Rukam, Mr. Vanderstraten (120) 23·03
Periyakulam, Mr. Carte (20) .. 6·07
Chadaiyantalawa, Mr. Goodman (57) 7·71
Kalmunai, do (12) 6·[illegible]5
Rotawewa, Mr Bower (30) 17·83
Lahugala, do (70) 10 07
Naulla, do (30) 14·57
Andankulam, Mr. Carte (41) .. 6·55
Manalpuddy, Mr. Vanderstraaten 21) 48·06
Maha-Oya-Tank, Mr. Vanderstraaten (190) 16·68
Potuvil, Mr Sinnayah (10) 14·17
Vakaneri Mr. Watts, (8) .. 11·45

N.-W. PROVINCE.

Magalawewa, Mr. Crabb (176) ... 8·03
Maha Uswewa tank, Mr. Adams (160) ... 5·55
Tenepitiya, Mr. Churchill (8) ... 5·47
Batalagoda, Mr. Madahapola — 5·26

N.-C. PROVINCE.

Kalawewa, Mr. Chellappah (268) 7·35
Maradankadawala, Mr. Emerson (443) ... 18·66
Mihintale, Mr. MacBride (354) .. 6·37
Horowapotana, Mr. MacBride (217) . 5·28
Madawachchiya, Mr. MacBride (285) ... 5·28
Topare, Mr. Jayewardane (200) .. 14·33
Minneriya, Mr. Eves — 16·38

UVA PROVINCE.

Bandarawela, Mr. Tocke (4,000) 7·34
Haldummulla, Mr. Viramuttoo (3,160) 10·32
Kumbukan, Mr. Devasagaiam (446) 7·90
Koslanda, Mr. Edge (?,258) .. 7 90
Tanamalwila, Not received (550) ... —
Bibile, Mr. Silva (680) 12·38
Taldena, Mr. Fernaudo (1,100) .. 12·41
[illegible]utuuwara—Mr. Leembruggen (?00) 14·81

SABARAGAMUWA.

Ambanpitiya, Mr. Gregson (729) 6·02
Pelmadulla, Mr. Bingham (480) 14·06
Kolonna Korale (Hulanda-oya), Not received (203) —
Avisawella, Mr. Clarke (105 .. 5·51

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Company	paid p. sh.	Buy-ers.	Sell-ers.	Tran-sactions
Agra Ouvah Estates Co., Ltd.	500	—	1000	900 ExDiv
Ceylon Tea and Coconut Estates	500	—	—	—
Castlereagh Tea Co., Ltd.	100	...	90	—
Ceylon Hills Estates Co. Ltd.,	100	—	—	...
Ceylon Provincial Estates Co. Ltd.	500	—	...	490
Claremont Estates Co., Ltd.	100	—	—	—
Clunes Tea Co., Ltd.	100	—	75	—
Clyde Estates Co., Ltd.	100	...	—	—
Dromco Tea Co., of Ceylon Ltd.	100	...	—	50
Drayton Estate Co., Ltd.	100	...	...	—
Eila Tea Co., of Ceylon, Ltd.	100	..	40	—
Estates Co., of Uva, Ltd.	500	—	250	..
Gangawatta	500	—	—	—
Glasgow Estate Co., Ltd.	500	—	—	—
Great Western Tea Co., Ltd.	500	625	—	..
Hapugahalande Tea Estate Co.	200	—	—	...
High Forests Estates Co., Ltd	500	...	600	...
Do part paid	400	—	...	—
Horekelly Estates Co., Ltd.	100	50	65	—
Kalutara Co., Ltd.	500	—	300	—
Kandyan Hills Co., Ltd.	100	—	70	—
Kanapediwatte Ltd.	100	—	90	—
Kelani Tea Garden Co., Ltd.	100	—	—	...
Kirklees Estates Co., Ltd.	100	—	120	—
Knavesmire Estates Co., Ltd.	100	—	65	—
Maha Uva Estates Co., Ltd	500	—	—	...
Mocha Tea Co., of Ceylon, Ltd.	500	—	..	—
Nahavilla Estate Co., Ltd.	500	—	375	—
Neboda Tea., Co. Ltd	500	..	..	..
Nyassaland Coffee Co. Ltd	100	—	—	—
Ottery Estates Co., Ltd.	100	—	—	—
Palmerston Tea Co., Ltd.	500	...	450	—
Penrhos Estates Co., Ltd.	100	—	100	—
Pine Hill Estate Co., Ltd.	60	—	50	—
Pitakanda Tea Company	500	—	—	—
Putupaula Tea Co., Ltd.	100	—	—	—
Ratwatte Cocoa Co., Ltd.	500	—	—	—
Rayigam Tea Co. Ltd.	100	...	50	—
Roeberry Tea Co., Ltd.	100	..	70	—
Ruanwella Tea Co., Ltd.	100	—	20	..
St. Heliers Tea Co., Ltd.	500	—	..	—
Talgaswela Tea Co., Ltd.	100	—	35	—
Do 7 per cent Prefs.	100	..	..	...
Tonacombe Estate Co., Ltd.	500	—	350	..
Udabage Estate Co., Ltd.	100	...	...	..
Udugama Tea & Timber Co., Ltd.	50	..	..	..
Union Estate Co., Ltd.	500	...	200	..
Upper Maskeliya Estates Co. Ltd.	500	—	—	—
Uvakellie Tea Co., of Ceylon, Ltd.	100	—	70	—
Vogan Tea Co., Ltd.	100	65	—	...
Wanarajah Tea Co., Ltd.	500	..	1060	..
Yatadeniya Tea Co., Ltd.	100	—	350	—

CEYLON COMMERCIAL COMPANIES.

Company	paid p. sh.	Buy-ers.	Sell-ers.	Tran-sactions
Adam's Peak Hotel Co., Ltd.	100	25	..	..
Bristol Hotel Co., Ltd.	100	120	122·50	120
Do 7 per cent Debts	100	105	...	—
Ceylon Gen. Steam Navgtn. Co., Ltd.	100	..	...	..
Colombo Apothecaries' Co. Ltd.	100	135	—	135
Colombo Assembly Rooms Co., Ltd.	20	15	..	...
Do prefs.	20	...	..	—
Colombo Fort Land and Building Co., Ltd.	100	—	90	..
Colombo Hotels Company	100	..	295	295
Galle Face Hotel Co., Ltd.	100	142·50	145	142·50
Kandy Hotels Co., Ltd.	100	...	125	..
Mount Lavinia Hotel Co., Ltd.	500	—	..	...
New Colombo Ice Co., Ltd.	100	200	...	...
Nuwara Eliya Hotels Co., Ltd.	30	..	...	30
Do 7 per cent prefs.	100	...	...	102·50
Public Hall Co., Ltd.	20	15	16	—

LONDON COMPANIES.*

Company	paid p. sh.	Buy-ers.	Sell-ers.	Tran-sactions
Alliance Tea Co., of Ceylon, Ltd.	10	8½	8¾—9¼	..
Anglo Ceylon General Estates Co.	100	..	5—45	..
Associated Estates Co., of Ceylon	10	..	1½—2½	...
Do. 6 per cent prefs.	10	..	4—6	..
Ceylon Proprietary Co.	1	...	3/8—5/8	..
Ceylon Tea Plantation Co., Ltd.	10	..	24—25	..
Dimbula Valley Co., Ltd.	5	..	5¾—6	..
Do prefs.	5	..	5½ 6	...
Eastern Produce & Estates Co. Ltd.	5	...	4½—5	..
Ederapolla Tea Co., Ltd.	10	...	7—10	...
Imperial Tea Estates Co., Ltd.	10	...	4½—5½	..
Kelani Valley Tea Assen., Ltd.	5	..	5—6	...
Kintyre Estates Co., Ltd.	10	...	6—8	..
Lanka Plantation Co., Ltd.	10	..	4—5	..
Nahalma Estates Co., Ltd.	1	..	nom	..
New Dimbula Co., Ltd.	1	...	2¾ 3	..
Nuwara Eliya Tea Estate Co., Ld.	10	...	10—10½	...
Ouvah Coffee Co., Ltd.	10	..	6—7	...
Ragalla Tea Estates Co., Ltd.	10	..	9—10	..
Scottish Ceylon Tea Co., Ltd.	10	..	13—15	...
Spring Valley Tea Co., Ltd.	10	...	2½—3½	..
Standard Tea Co., Ltd.	6	..	11—11½	..
The Shell Transport and Trading Company, Ltd.	1	..	2 7/8—3 1/8	..
Ukuwella Estates Co., Ltd.	25	—	—	...
Yatiyantota Ceylon Tea Co., Ltd.	10	...	6½—7½	...
Do. pref. 6 o/o	10		10—10½	..

BY ORDER OF THE COMMITTEE.

Colombo, February 8th, 1901.

* Latest London Prices.

THE LOCAL MARKET.

(By Mr. James Gibson, Baillie St., Fort.)

Colombo, Feb. 7th, 1901.

COFFEE:—	
Estate Parchment per bushel	None
Chetty do do	Nil.
Native Coffee per cwt.	Nil.
do F. O. B per cwt.	Nil.
Liberian coffee:—per bushel	Nil.
do cleaned coffee:—per cwt	Nil.
Cocoa unpicked:—per cwt	R41·00 to 44·00
do cleaned do	R44·00 to 52·00
Cardamoms Malabar per lb	R1·20 to 1·30
do Mysore do	R1·70 to 2·00
RICE:—	
Soolai per bag of 164 lb. nett	R9·36 to 9·78
1st quality:—per bushel	R3·70 to 3·75
Soolai 2 & 3rd. do do	R3·58 to 3·68
Coast Calunda	none available.
Coast Kara	R3 90 to 4·00
Kazala	R3·52 to 3·57
Muttusamba Ordinary	R4·75 to 5·00
Cinnamon per lb No 1 to 4	R 0·53 to 00 54
do do 1 and 2	R00·61 to 00 62
do Chips per candy	R 5·00 to 90·00
Coconuts Ordinary per thousand	R35·00 to 38·00
do Selected do	R36·00 to 39·00
Coconut Oil per cwt	R14·15 to 15·00 } Business done.
do do F. O B. per ton	R283·50 to 300·00 } Business done.
POONAC:—	
Gingelly per ton	R100·00
Coconut Chekku do	R110 00
do Mill (retail) do	R90·00
Cotton Seed per ton	R80·00
Copra per candy	
Kalpitiya do	R48·00 to 49 50
Marawilla do (Boat)	R47·00 to 48·00
Cart Copra do	R36 00 to 4[illegible]·00
Satinwood per cubic feet.	R2·00 to 2·25
do Flowered do	R5·00 to 6·00
Halmilla do	R1·90
Palu do	R1·00 to 1·12
Ebony per ton	R75·00 to 175·00
Kitul fibre per cwt	R30·00 to 32·00
Palmyra do do	R6·00 to 14·00
Jaffna Black Cleaned per cwt	R13·00 to 14·00
do mixed do	R11·00 to 2·00
Indian do	R6·00 to 12·00
do Cleaned do	R8·00 to 14·00
Sapanwood per ton	R42·50 to 47·50
Kerosene oil American per cases,	R7·00 to 7·25
do bulk Russian, per tin	R3·12 to 3·15
do Russian per cases	R6·[illegible]0 to 6·40
Nux Vomica per cwt	R2·00 to 6·50
Croton Seed per cwt	R2[illegible]·00 to 22·00
Kapok cleaned f o b per cwt	R24·00
do uncleaned do	R5·[illegible]
Plumbago per ton, according to grade: Large lumps	R[illegible]00·00 to 650·00
Ordinary size lumps	R250·00 to 6[illegible]0·00
Chips	R[illegible]0·00 to 4[illegible]0·00
Dust	R60·00 to 250·00

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

EXPORTS.

Colombo, 4th Feb. 1901.

CARDAMOMS:—
All round parcel, well bleached per lb. R1·80
Do. dull medium do. R1·40
Speecial assortment, 0 and 1 only do. R2·20
Seeds do. R1·35

CINCHONA BARK:—
Per unit of Sulphate of Quinine 9c—For 1½ to 3 o/o.

CINNAMON :—
Ordinary assortment per lb. 56½c.
Nos. 1 and 2 only per lb. 62c.
Nos. 3 and 4 only per lb. 54c.

CINNAMON CHIPS :—
Per candy of 560 lb R90·00

COCOA :—
Finest estate red; unpicked per cwt R58
Medium do do R54
Bright native, unpicked and undried R52
Ordinary do do do R44

COCONUTS—(husked).
Selected per thousand R48·00
Ordinary ,, R40·00
Smalls ,, R30·00

COCONUT CAKE—
Poonac in robins f. o. b. per ton R72·50
Do in bags None

COCONUT (Desiccated).
Assorted all grades per lb 14½c

COCONUT OIL—
Dealers' Oil per cwt R15·00
Coconut Oil in ordinary packages f. o. b. per ton R330·00 Business done.

COFFEE.—
Plantation Estate Parchment on the spot per bus. None.
Plantation Estate Coffee f.o.b. (ready) per cwt. None.
Native Coffee, f.o.b per cwt.—None.

CITRONELLA OIL—
Ready do per lb.—None.

COPRA—
Boat Copra per candy of 560 lb. R48·00
Calpentyn Copra do do R49 50
Cart do do do R43·00
Estate do do do R48·50

CROTON SEED per cwt—None

EBONY—
Sound per ton at Govt. depot—R230 As per last Govt. sales of Dec 3rd.
Inferior R155.—As per last Govt. sales of Dec 3rd.

FIBRES—
Coconut Bristle No. 1 per cwt R10·50
Do ,, 2 ,, None
Do mattress ,, 1 ,, 4·00
Do ,, 2 ,, 3·00
Coir Yarn, Kogalla ,, 1 to 8 18·00
Do Colombo ,, 1 to 8 16·00
Kitool all sizes ,, None
Palmyrah ,, None

PEPPER—Black per lb None

PLUMBAGO—
Large lumps per ton R650
Ordinary lumps do 600
Chips do 400 No Enquiry
Dust do 250
Do (Flying) 125

SAPANWOOD— per ton None.
SATINWOOD (ordinary) per cubic ft. None.
Do do per cubic ft. None.

TEA—	High Grown Average.	Medium Average.	Low Grown Average.
Broken Pekoe and Broken	cts	cts	cts
Orange Pekoe per lb	47	47	30
Orange Pekoe do	52	36	32
Pekoe do	43	32	25
Pekoe Souchong do	43	21	20
Pekoe Fannings do	29	21	22
Broken mixed—dust, &c per lb	17	17	14

CEYLON EXPORTS AND DISTRIBUTION, FOR SEASONS 1900 AND 1901.

COUNTRIES	Tea. 1901 lbs.	Tea. 1900 lbs.	Coffee—cwt. Plantation	Coffee—cwt. N'tive	Coffee—cwt. Total.	Cocoa cwts.	C'mons lbs.	Cinnamon Bales lbs.	Cinnamon Chips. lbs.	Coconut Oil. 1901 cwt	Coconut Oil. 1900 cwts	Copra cwts.	Desiccated Coconut lb.	Poonac cwts.	Coconuts No.	Plumbago. 1901 cwts.	Plumbago. 1900 cwts.	Fibre.	Ebony cwts.
To U K.	10888137	9234210	305	..	305	5963	17855	147431	28	18076	14427	2000	522725	...	910795	8309	6728	3773	..
,, Austria	330	100	..	..	...	...	..	..	5600	772	1616	...	..	.	..	...	..	...	...
,, Belgium	..	..	..	..	..	...	..	1200	..	500	...	3151	..	..	...	927	2643	1006	...
,, France	20994	12834	..	...	..	..	1171	...	2240	...	..	1540	..	...	..	..	..	..	..
,, Germany	33045	39773	.	..	..	50	1420	51900	6552	..	2243	2563	123135	4004	69500	3455	6501	1497	1080
,, Holland	11074	..	...	..	..	..	..	1000	..	..	..	..	...	..	..	..	..	201	...
,, Italy	669	433	..	..	..	..	...	10000	5600	...	..	..	..	..	..	..	...	...	...
,, Russia	727093	645408	..	..	...	...	761	...	..	...	..	12210	..	..	..	..	...	..	...
,, Spain	...	3170	..	...	..	..	..	..	5600	..	..	...	...	...	..	...		..	..
,, Sweden	11315	12580	...	..	..	..	..	..	..	..	...	...	...	...	..	..	105	..	...
,, Turkey	9869	1400	...	..	...		..	..	...	..	...	...	...	...	...	...	...	..	..
,, India	116998	52004	9	..	9	..	14217	..	..	2949	5711	240	..	...	98400	..	..	..	..
,, Australia	409283	855517	...	..	..	...	...	...	..	...	..	..	3900	..	..	...	10	50	..
,, America	138235	541717	...	..	...	622	..	10000	..	6004	15223	1	138000	..	..	17410	24717	354	..
,, Africa	9713	6330	..	..	..	..	..	..	..	..	...	..	560	..	106400	...	...	...	..
,, China	40253	41265	...	...	..	..	..	..	..	..	...	..	..	..	..	..	..	..	...
,, Singapore	5410	1000	..	..	...	196	..	4000	..	...	..	...	..	...	...	..	...	47	...
,, Mauritius	3100	...	..	..	..	...	..	..	..	..	..	...	..	...	...	..	..	..	...
,, Malta	24900	32220	..	...	..	..	..	...	..	..	..	..	...	..	..	..	..		..
Total export from 1st Jan. to 4th Feb. 1901	12456415	11479961	314	...	314	6831	35427	225531	84588	28281	29230	21705	788320	4004	1185095	30101	40770	6928	1080

MARKET RATES FOR OLD AND NEW PRODUCTS.

(From Lewis & Peat's Fortnightly Price Current, London, January 23rd, 1901.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry	34s a [illegible]5s
Zanzibar & Hepatic ,,	Common to good ..	20s a 60s
ARROWROOT (Natal) lb.	Fair to fine .	5½d a 6¼d
BEES' WAX cwt.		
Zanzibar & Bombay White ,,	Good to fine	£6 a £7 10s
Zanzibar & Bombay Yellow ,,	Fair ,,	£6 5s a £6 17s 6d
Madagascar ,,	Dark to good palish	£6 a £6 1[illegible]s
CAMPHOR, China ,,	Fair average quality	182s 6d
Japan ,,	.. ..	192s 6d
CARDAMOMS, Malabar	Clipped, bold, bright, fine	[illegible]s 3d a [illegible]s [illegible]d
	Middling, stalky & lean	[illegible]s 5d a 1s 7d
Ceylon. Mysore ,,	Fair to fine plump ..	1s 6d a 4s [illegible]d
	Seeds ..	2s 6d a 2s 8d
,, Tellicherry ,,	Good to fine ..	2s 11d a 3s
	Brownish .	2s 6d
,, Long ,,	Shelly to good ..	2s 11d a 3s 6d
,, Mangalore ,,	Med brown to good bold	2s a 3s 6d
CASTOR OIL, Calcutta ,,	1sts and 2nds ..	4d a 4½d
CHILLIES, Zanzibar cwt.	Dull to fine bright ...	35s a 45s
CINCHONA BARK.—lb. Ceylon	Ledgeriana Orig. Stem	3¾d a [illegible]¾d
	Crown, Renewed	5d a 7d
	Org. Stem	3¾d a 5½d
	Red Org. Stem	4⅜d a 5⅝d
	Renewed	5⅝d a 7½d
	Root	3¾d a 4d
CINNAMON, Ceylon 1sts per lb.	Ordinary to fine quill	11d a 1s 8d
2nds	,, ,,	10d a 1s [illegible]d
3rds	,, ,,	9½d a 1s 6d
4ths	,, ,,	8[illegible]d a 11½d
Chips	,, ,,	3½d a [illegible]d
CLOVES, Penang lb.	Dull to fine bright bold	[illegible]½d a 9d
Amboyna ..	Dull to fine	4½d a 5½d
Zanzibar and Pemba	Good and fine bright	[illegible]½d a [illegible]¾d
	Common dull to fair	[illegible]d a 4⅜d
Stems ..	Fair	1⅜d
COFFEE		
Ceylon Plantation ,,	Bold to fine bold colory	9[illegible]s a 110s
	Middling to fine mid	80s a 90s
	Low mid. and low grown	7[illegible]s a 77s 6d
	Smalls	50s a 60s
Native	Good ordinary	30s a 70s
Liberian ,,	Small to bold	35s a 40s
COCOA, Ceylon ,,	Bold to fine bold	85s a 102s 6d
	Medium and fair	75s a [illegible]2s 6d
	Native	60s a 70s
COLOMBO ROOT ,,	Middling to good	12s a 20s
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair	£13 [illegible]s a £18
FIBRE, Brush ,,	Ord. to fine long straight	£16 a £19
Cochin ,,	Ordinary to good clean	£20 a £29
Stuffing ,,	Common to fine	£7 a £9
COIR YARN, Ceylon ,,	Common to superior	£15 a £33
Cochin ,,	,, ,, very fine	£12 a £32
do. ,,	Roping, fair to good	£10 a £14 10s
CROTON SEEDS, sift. cwt.	Dull to fair	3[illegible]s a [illegible]0s
CUTCH ,, ,,	Fair to fine dry	2[illegible]s a 35s
GINGER, Bengal, rough ,,	Fair	34s
Calicut, Cut A ,,	Good to fine bold	[illegible]0s a 100s
B & C ,,	Small and medium	33s a 77s 6d
Cochin Rough ,,	Common to fine bold	28s a 34s
	Small and D's	2[illegible]s a 30s
Japan ,,	Unsplit	2[illegible]s a 30s
GUM AMMONIACUM ,,	Sm. blocky to fine clean	20s a 45s
ANIMI, Zanzibar ,,	Picked fine pale in sorts	£10 7s 6d a £20
	Part yellow and mixed	£8 2/6 a £10 10s
	Bean and Pea size ditto	70s a £9 [illegible]/6
	Amber and dk. red bold	£5 10s a £7 10s
	Med. & bold glassy sorts	80s a 100s
Madagascar ,,	Fair to good palish .	£4 8s a £8
	.. ., red .	£4 5s a £9
ARABIC E. I. & Aden ,,	Ordinary to good pale	35s a 60s
Turkey sorts ,,		65s a 80s
Ghatti ,,	Pickings to fine pale ..	12s 6d a 35s
Kurrachee ,,	Good and fine pale ..	52s 6d a 55s
	Reddish to pale selected	30s a 4[illegible]s
Madras ,,	Dark to fine pale ..	23s a 35s
ASSAFŒTIDA ,,	Clean fr to gd. almonds	40s a 85s
	Ord. stony and blocky	6s a 25s
KINO ,,	Fine bright	1s a [illegible]s 3d
MYRRH, picked ,,	Fair to fine pale	9[illegible]s a 107s 6d
Aden sorts ,,	Middling to good	50s a 60s
OLIBANUM, drop ,,	Good to fine white	35s 6d a 50s
	Middling to fair	25s a 35s
pickings ,,	Low to good pale	17s a 20s
siftings ,,	Slightly foul to fine	16s 6d a 18s
INDIARUBBER, Assam lb	Good to fine	2s 10½d a 3s 0¼d
	Common to foul & mxd.	1s 4d a 2s 6d
Rangoon	Fair to good clean ...	2s 3d a 3s 3d
Borneo	Common to fine	1s a 2s 4d

	QUALITY.	QUOTATIONS.
INDIARUBBER, (Contd)		
Java, Sing. & Penang lb.	Foul to good clean ..	8d a 3s 3d
Mozambique ,,	Good to fine Ball ...	2s 6d a 3s 2d
	Ordinary to fair Ball ..	1s 10d a 2s 6d
	Low sandy Ball	1s 3d a 1s 7d
	Sausage, fair to good	2s 6d a 3s 1d
	Liver and Livery Ball	2s 4d a [illegible]s
Nyassaland ,,	Fair to fine ball	2s 9d a 3s
Madagascar ,,	Fr to fine pinky & white	2s 8½d a 3s
	Fair to good black ..	2s a 2s 10d
	Niggers, low to fine .	11d a 2s 4d
INDIGO, E.I. ,,	Bengal—	
	Shipping mid to gd violet	3s 4d a 4s 4d
	Consuming mid. to gd.	2s 9d a [illegible]s 2d
	Ordinary to mid.	2s 4d a 2s 8d
	Mid. to good Kurpah	2s 2d a 2s 8d
	Low to ordinary	1s 10d a 2s [illegible]d
	Mid. to good Madras	[illegible]s 6d a 2s 8d
MACE, Bombay & Penang per lb.	Pale reddish to fine	[illegible]s a 3s
	Ordinary to fair	[illegible]s 4d a 1s 11d
	Pickings	1s 3d a 1s 4d
MYRABOLANS, Madras cwt	Dark to fine pale UG	6s a 7s
	Fair Coast	5s 6d a 6s
Bombay ,,	Jubblepore	4s 3d a 7s
	Bhimlies	4s [illegible]d a 9s 6d
	Rhajpore, &c.	4s 3d a 8s
Bengal ,,	Calcutta	4s 6d a 6s
NUTMEGS— lb.	64's to 57's	[illegible]d 1½d a [illegible]s 6d
Bombay & Penang ,,	110's to 65's	1[illegible]½d a 2s 1d
	160's to 130's	6d a 11d
NUTS, ARECA cwt.	Ordinary to fair fresh	15s a 17s
NUX VOMICA, Bombay per cwt.	Ordinary to middling	4s a 5s 6d
Madras	Fair to good bold fresh	7s a 10s
	Small ordinary and fair	[illegible]s 6d
OIL OF ANISEED lb	Fair merchantable	[illegible]s 6d a 5s 9d
CASSIA ,,	According to analysis	[illegible]s 8d a 4s
LEMONGRASS ,,	Good flavour & colour	3d
NUTMEG ,,	Dingy to white	[illegible]d a 3½d
CINNAMON ,,	Ordinary to fair sweet	3¼d a 1s 6d
CITRONELLE ..	Bright & good flavour	1[illegible]d a 1s 0½d
ORCHELLA WEED—cwt		
Ceylon ,,	Mid. to fine not woody	[illegible]0s a 12s 6d
Zanzibar. ,,	Picked clean flat leaf	10s a 16s
	,, wiry Mozambique	10s a 11s
PEPPER (Black) lb.		
Alleppee & Tellicherry	Fair to bold heavy ..	6¼d a 6 5-16d
Singapore	Fair	6¼d a 6s 5-16d
Acheen & W. C. Penang	Dull to fine ...	5¾d a 6⅛d
PLUMBAGO, lump cwt.	Fair to fine bright bold	3[illegible]s a 40s
	Middling to good small	2[illegible]s a 32s
chips ,,	Dull to fine bright ..	10s a 20s
dust ,,	Ordinary to fine bright	[illegible]s a [illegible]0s
SAFFLOWER ,,	Good to fine pinky .	65s a 75s
	Inferior to fair	40s a 60s
SANDAL WOOD—		
Bombay. Logs ton.	Fair to fine flavour ..	£20 a £50
Chips ,,	.. . ...	5s a £8
Madras. Logs ,,	Fair to good flavour ..	£20 a £50
Chips ,,	Inferior to fine ...	£4 a £8
SAPANWOOD Ceylon ,,	Fair to good .	£5 a £5 10s
Manila ,,	Rough & rooty to good	£4 10s a £5 15s
Siam ,,	bold smooth	£7
SEEDLAC cwt.	Ord. dusty to gd. soluble	51s 6d a 59s 6d
SENNA, Tinnevelly lb	Good to fine bold green	5d a 8d
	Fair middling medium	3½d a 4¼d
	Common dark and small	1d a 3¼d
SHELLS, M. o'PEARL—		
Bombay cwt.	Bold and A's	£3 10s a £4 10s
	D's and B's	
	Small ...	
Mergui ,,	Small to bold ..	£5 12/6 a £7 10s
Mussel ,,	Small to bold ..	22s a [illegible]7s 6d
TAMARINDS, Calcutta... per cwt	Mid. to fine bl'k not stony	15s a 16s
Madras	Stony and inferior ..	7s 6d a 11s
TORTOISESHELL—		
Zanzibar & Bombay lb.	Small to bold dark mottle part heavy	14s 6d a 21s
TURMERIC, Bengal cwt.	Fair ..	28s nom.
Madras ,,	Finger fair to fine bold bright	22s a 30s
Do. ,,	Bulbs ..	18s
Cochin ,,	Finger .	24s
	Bulbs ..	7s 6d
VANILLOES— lb.		
Mauritius ... 1sts	Gd. crysallized 3½ a 9 in	16s a 24s
Bourbon ... 2nds	Foxy & reddish 4½ a 8 ,.	15s a 18s
Seychelles 3rds	Lean and inferior ...	8s a 13s
VERMILION lb.	Fine, pure, bright ...	3s 3d
WAX, Japan, squares cwt	Good white hard ...	33s 6d

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for February :—

Vol. XII.] FEBRUARY, 1901. [No. 8.

THE TEACHING OF AGRICULTURE IN RURAL SCHOOLS.

I

WHILST we have nothing but praise for the excellent system of State school education throughout the colony, whilst we respect and appreciate at their full value the State school teachers, and the splendid work they have done and are continuing to do in the cities and townships throughout this great territory of Queensland, we believe we are justified in saying that there is still one channel through which the stream of instruction has not yet flowed—a channel which, if once filled and set flowing, will carry the beneficent stream throughout the land, eventually bringing wealth, health, and rural comfort to thousands of homes. This so long neglected channel is Agricultural Education. Let us at once say that we do not advocate a systematic course of instruction in the science of agriculture in the State schools. In the nature of things such a course would be impossible—first, because the time spent at the schools by children in the rural districts is of short average duration, hence allowing an all too brief period for mastering the three R's and a certain amount of geography, history, &c.; secondly, because the teachers were never expected to add agricultural subjects to the ordinary school curriculum, and hence went through no course of preparation, nor were they required to pass any examination in agriculture. We may further point out that whatever pleasure the teachers may personally derive from the cultivation of a piece of land in their spare and holiday times, or from the rearing of poultry and cattle, yet teachers are not farmers. The long course of arduous study and training gone through by them during their pupil-teachership, and whilst passing through the various grades to the higher classes, necessarily left them no time to study agriculture in a practical manner. Instruction of a comprehensive nature in the branch of education can therefore only be given in an Agricultural College, or in Dairy Schools, where all the instructors are specialists in their own particular branch of the various industries coming under the head of "agriculture."

But, these premises being conceded, we hold that it is quite within the range of possibility to render the instruction imparted in the schools under notice more consonant with the environment of the pupils than is now the case. It can be shown that without altering the curriculum in any way, without adding one single fresh burden to the teachers or pupils, that curriculum can be so handled as to attain the desired end in a manner not only not burdensome, but rather enjoyable to teachers and taught.

What is one of the most important duties of the teacher? Is it not to train the faculties of observation and research in the child. And how can this be better accomplished than by encouraging the spirit of inquiry—the curiosity, we may call it, so natural to every child?

More particularly should children be encouraged to observe the phenomena of Nature, and the results of her operations in the ordinary events of

daily occurrence everywhere about them. They should be invited to collect specimens of natural history, and to ask questions about all they see. Wherever possible, they should be encouraged to take a share in beautifying the school premises; they should be allowed to cultivate small plots of ground. Whilst doing this, they would soon discover that certain causes produce certain effects. They would find that their flowers, fruits, or vegetables will not thrive except under certain conditions—such as a supply of necessary plant food, manure, water, heat, or cold. Insect pests would also claim their attention, and in a simple way the intelligent teacher would explain how all this comes about, and how the enemies of plant life are kept in check. Then he could cause them to observe the habits of insects and, point out how they act as fertilisers of certain blossoms. The harmless and dangerous insects and animals would come in for innumerable subjects for object lessons. There is no need for any text-books to be placed in the children's hands; no set lessons should be learned by heart. All should be spontaneous on both sides. The teacher himself would no doubt refresh his memory, or gain some useful information from books; but no book should be employed in conversation on any of these little subjects with the pupils.

One valuable means towards inculcating a love of Nature in the youthful mind is the taking of occasional walks into the country. Every one knows how children, both boys and girls, will scatter about, following the bank of a stream, or wandering through the scrubs or fields picking up all kinds of insects, flowers, stones, and fruit. All these they should be encouraged to learn something about, not in a dry-as-dust fashion, but in a pleasant, intimate, conversational manner. There is another way of arousing their interest, that is, by stimulating the dormant faculty of imitation latent in most children, but very apparent in some. They should be provided with pencil and paper, or a slate and pencil, and induced to try and copy such specimens as they might find, but the most ludicrous efforts in this direction should be taken by the teacher as seriously as if they were models of art. Nothing so much damps a child's enthusiasm as a sneer. Every little first attempt should be commended, and the pupil helped to improve.

There are all sorts of other ways in which a painstaking teacher can inculcate a love of rural life in the children entrusted to his or her care, but we have said enough for the present. We may state that the above remarks are dictated by actual experience. They are not theory, for we put them into practice for several years, and always with the most encouraging results. Yet the ordinary work of a school was never for a moment disturbed. We therefore maintain that what has been done successfully once can be done and should be done again.

II.

The idea that the elements of Agriculture should be taught in our rural State schools commends itself to the earnest consideration of all who desire to see a healthy, rural population growing up around us. As matters are at present, there is a growing tendency on the part of the rising generation in the country districts to gravitate towards the towns instead of going on to the land, and by steady application to farming or pastoral pursuits, building up for themselves in the future comfortable homes, where by diligence and economy they may eventually become independent of "billets," either under the Government or in private employ, the remuneration in which is, owing to the severe competition, barely enough to provide food and lodging. On this subject we print the subjoined extracts from the Bulletin of the Agricultural Department of the West Indies. At an Agricultural Conference held in Barbados, one delegate said:—

"The time has arrived when it is absolutely necessary that elementary education should be made more practical, and I feel sure that these West Indian Colonies will do their utmost, with the limited means at their disposal, to make it so. There has been very little attempt made in the past to draw out and train the faculties of children. Our system must be remodelled so as to draw out these faculties.

'In too many cases' (to quote from a paper by Mr. F. J. Lloyd) 'the sole object of education has been to cram a certain number of useless and disconnected facts, or pseudo-facts, into what is termed the brain. Teachers recognise one faculty, and one only, viz., memory; and to train this one faculty to the neglect of every other has been the sole object of education for ages past, and remains so mainly to the present day. It has entirely neglected to develop manual skill; it has neglected to draw out or cultivate any mental faculty save memory; and even for this purpose has utilised subjects, the recollection of which would in no wise benefit the future farmer. But, far worse than this, it has neglected the most valuable of Nature's gifts to all of us, the strongest natural faculty we possess—observation. What is the most striking faculty possessed by a child from three to six years of age? The power of observation. Watch that same child between the ages of thirteen and sixteen, and the power, though at times manifesting itself, is gradually becoming dormant, partly because it has not been cultivated, partly from its constant suppression by the ignorance and heedlessness of those who surround the child. Ten years later the faculty is practically non-existent, lost from neglect of use, as a singer may lose the power of song, or a musician the power of execution. The difficulty now found in improving agricultural education depends greatly upon this failure of the past.'

Be ours the task, as far as lies in our power, to try and remedy this defect in our educational systems in the West Indies."

Mr. H. Collens, Acting Inspector of Schools at Trinidad, in alluding to the objection some parents have to their children being taught to do anything entailing manual labour at school, said:—"If there is an attempt to make a child in the schools do manual labour, the parents state their objections very forcibly. I agree with Mr. Hicks that, if our attempts to teach agriculture in elementary schools are to be successful, the greatest

possible fact must be shown by the officers concerned. We must not drive or coerce the people; above all, we must try and instil into the children's minds a love of Nature, and the necessity of learning Nature's methods. If we succeed in doing that, we may hope in time to turn their attention to field pursuits and to agriculture generally as a means of earning a livelihood. We must, however, proceed cautiously. In Trinidad it has been decided that the teachers should, first of all, have a course of lectures, and, in the event of their showing aptitude in teaching agriculture and passing an examination in the syllabus laid out, they are to be rewarded by receiving a bonus on the results of the examination of their schools at the end of the year.

"That is one encouragement; but we have another. We have made the examination the means for promotion from the third class to the second. That is an important means of influencing the teacher, because it directly touches his pocket. Then with regard to teaching in the schools, we make considerable use of Blackie's Tropical Readers. These are used as alternate reading books. I feel a deep personal interest in this subject of teaching agriculture in elementary schools. I have given considerable thought to it, and I am convinced if we are to do any real good we must exercise great caution, and always place the pleasantest side before the parents and the teachers. Otherwise, we shall fail."

A third speaker took a sentimental view of the question.

"The eyes," he said, "of the country child should be unsealed. He should be made to see the beauties and wonders that lie about his feet, and are to be found in profusion all round him. A sympathetic, skilful teacher will invest rural life with an interest that will attract and fascinate. The life that was monotonous, dull, insipid, and purely mechanical will be changed into one full of interest, and with this there will be gained a discipline of the mind, a development of intellectual power which are prominent aims of all true education. The new knowledge and skill will be to the country boy as a new tool, the possession of a new power, and he will be eager to make use of it.

"What is done on a small scale in a corner of the school plot or in the box-garden will be reproduced at home on a larger scale and with added interest. It will be his delight to show what he can do, and the useful results of his doing. He will find use for his knowledge of reading, writing, and arithmetic in connection with his observations and experiments in the study and mastery of some of the secrets of Nature. He will have a desire to read; and, if we are wise, we shall see that he has opportunity by providing the school with a suitable library and some of the books specially applicable to country life."

In France and in the United States, agriculture has been introduced as one of the subjects to be taught with the express view of preventing the constant drifting of the youth into the great cities. Illinois has now decided to introduce elementary courses in agriculture into the State public schools with the primary purpose of interesting country school boys in what may be their life work. The course will be adopted especially to the country schools, but it will be introduced into town and city classes in a modified form. One hope of those who have been instrumental in securing the adoption of the study is that it may tend to stem the tide of migration of the boys from the country to the city.—*Queensland Agricultural Journal.*

OCCASIONAL NOTES.

Mr. Kelway Bamber, Agricultural Chemist, has established a laboratory in Hunupitiya Road near the junction with Park Street, and not far from the Victoria Park.

The students for the School of Forestry left Colombo on tour on the 15th. They proceeded to Kurunegala and established their first camp in the Sudugama forest.

We have been hearing from Mr. C. F. Fernando, an old boy of the School of Agriculture, who left for South Africa to seek his fortune. He is still full of hope as to his future in the new country, and we have little doubt that with his ability he will succeed in finding suitable work to do.

Veterinary Surgeon Chinniah's article on Vasectomy, which originally appeared in these pages has been taken over by the *Veterinarian* (London). Mr. Chinniah has repeated the operation on a bull at Grove Estate, Ukuwella, with the same success as before. The after treatment in vasectomy is very simple, and the bull operated on was able to go to work in a fortnight's time.

Mr. Chinniah is reprinting his papers on the Branding of Cattle, and it will shortly appear in convenient pamphlet form so as to be available to all.

The closing of the School of Agriculture has been ordered by Government, and as a tentative measure agricultural work will be carried on though rural schools with connected school gardens. The Superintendent of the School of Agriculture will assume the duties of Superintendent of School Gardens. We are convinced that good results should follow this new departure, and we notice the Ceylon press is of the same opinion.

A gymnasium in connection with the School of Agriculture was opened on the 1st December in the presence of a large gathering, presided over by the Director of Public Instruction.

The School of Agriculture re-opened after the Christmas holidays on the 15th January. On instructions received from Government a new class of students was not admitted this year.

Mr. J. Rodrigo, Manager of the Government Dairy went over to Madras on the 4th December, and brought over 22 cows for the dairy.

A sale of 8 cows and 12 calves drafted from the Government Dairy herd took place on the Government Dairy on Thursday, the 17th inst., with the following results :—

	Rs.
One cow and calf purchased by Mr. H. P. Rudd for	50
,, ,, purchased by Mr. Chas Peiris ...	26
,, ,, ,, Dr. Rockwood ...	55
,, ,, ,, Mr. P. Ratnasapapatby	50
,, ,, and calf ,, ,, Chas. Peiris ...	57
,, ,, ,, ,, ,, ...	45
,, ,, and calf ,, ,, ,, ...	21
,, ,, ,, ,, Richard Perera	40
One bull calf ,, ,, W. B. de Saram	63
,, ,, ,, C. E. A. Dias ...	48
,, ,, Dr. G. de Saram ...	78
,, ,, Mr. Ekanayaka, Md.	62
One cow calf ,, ,, ,,	40
,, ,, ,, Chas. Peiris ...	60
,, ,, ,, ,, ...	38
,, ,, ,, W. B. de Saram	47
,, ,, ,, Ratnasapapatby	50
,, ,, ,, Chas. Peiris ...	57
,, ,, ,, H. P. Rudd ...	47
,, ,, ,, Chas. Peiris ...	47
	Rs. 981

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF DECEMBER, 1900.

1	Saturday ..	·23	18	Tuesday ..	2·52
2	Sunday ..	·29	19	Wednesday	·06
3	Monday ..	Nil	20	Thursday ..	·59
4	Tuesday ..	1·10	21	Friday ..	Nil
5	Wednesday ..	Nil	22	Saturday ..	Nil
6	Thursday ..	Nil	23	Sunday ..	Nil
7	Friday ..	·39	24	Monday ..	Nil
8	Saturday ..	Nil	25	Tuesday ..	Nil
9	Sunday ..	Nil	26	Wednesday	Nil
10	Monday ..	Nil	27	Thursday ..	Nil
11	Tuesday ..	Nil	28	Friday ..	Nil
12	Wednesday ..	·71	29	Saturday ..	Nil
13	Thursday ..	Nil	30	Sunday ..	Nil
14	Friday ..	·06	31	Monday ..	·02
15	Saturday ..	Nil	1	Tuesday ..	Nil
16	Sunday ..	Nil			
17	Monday ..	·02		Total..	5·76
				Mean..	·18

Greatest amount of rainfall in any 24 hours on the 18th, 2·52 inches.

Recorded by C. DRIEBERG.

COCONUT MANURES.

We are inclined to think that the complete analysis of the coconut made by Dr. Bachofen, the Chemist in charge of Mr. A. Baur's laboratory, established in connection with the latter's manure works, did not, at the time of its publication in the Press—nearly a year ago—receive the attention it merited. We are reminded of this fact by seeing the results of the analysis, as originally published in Ceylon, going the round of the Agricultural press in the various colonies. The analysis referred to is undoubtedly a valuable one, and shows in as definite a way as it is possible for an analysis to show, the actual demands made by the coconut upon the mineral constituents of the soil. On reading through the figures of Dr. Bachofen's analysis, the most remarkable facts are the large percentages (1) of potash (30·7 %) and common salt (45·95 %) in the ash of the husk; (2) of potash (54 %) in the ash of the shell; (3) of potash (45·8 %) in the ash of the kernel; and (4) of potassium chloride (41 %) and common salt (26·3 %) in the ash of the "milk." Calculating the quantity in pounds removed by a thousand nuts (assuming that the entire nuts are conveyed off the land) we find that the following are the figures for the chief ingredients of plant food :—

Nitrogen	8·6	lbs.
Phosphoric acid... ...	2·4	,,
Potash	18·7	,,
Lime	2·3	,,
Common suet	21·4	,,

It will be readily conceded by any one perusing these figures that, to meet the demands of the coconut, the use of potash manures and common salt together with the nitrogenous and phosphatic fertilizers usually applied, should not be neglected. That well-known authority, Professor Warrington, tells us that neither sodium nor chloride are among the essential elements of plant food, but that they are to be included in a class, which, though not indispensable, yet perform useful functions in the plant economy. But certain plants have, so to speak, a "fancy" for special ingredients of plant food—essential or non-essential, such as that of the glorias and *diatomaceae* for sillica, kumbuk, terminalia glabra, for lime (the bark containing no less than 50 % of the carbonate species of *solsola* for carbonate of soda &c. It may be assumed in the case of the coconut that it has a decided penchant for common salt), and this being so, there is no justification for giving it so niggardly an allowance as finds its way into the palm with the ingredients of wood-ashes and other manurial substances. The very fact of the palm being found growing with impunity with its roots saturated with sea-water—a condition of things few cultivated plants are calculated to tolerate—is a direct enough indication that the coconut revels in well-salted food. We find the coconut has become reconciled to inland sites, where it grows and waxes strong on the rich soils of the interior, contented with a less salted diet that it had on the comparatively barren sands of the sea shore. So, too, cereals which affect sillica will grow even in the total absence of this ingredient. But with the large demands made by the palm, as shown by analyses, for common suet and potash, it is only reasonable that the limited supplies in the soil should be supplemented with *added fertility* as regards these substances. On referring to Mr. Cochran's published analysis of the husk of the coconut, we find very similar figures given to those of Dr. Bachofen for the percentage of potash and common salt. Mr. Cochran's analysis gives the following percentages for the two salts respectively, 3·45 % and 4 %,

those of Dr. Bachofen being 3·7 % and 45·95 % respectively. Mr. Cochran cites the case of the mangel, a plant with a strong predeliction for salt, (its roots containing no less than 45 %, and its leaves 37 % of sodium chloride) as being greatly benefited by applications of common salt together with the fertilizers, and makes the following important statement: "From the evidence before us, I am disposed to consider the coconut trees as one of the special cases in which salt is useful as a manure."

With the opinion of two of the three analytical chemists in our midst to guide him, the coconut planter cannot surely hesitate any further to recognise the importance of using potash salts together with common salt in the manuring of his palms.

It would be interesting to ascertain the views of Mr. Kelway Bamber who has just established himself in a new laboratory in Colombo, as Government-cum-Planter's Chemist. Mr. Bamber has come to us with a made reputation as an authority on the Chemistry of tea, being an Agricultural Chemist of high qualifications, his views with regard to the manuring of coconuts should prove most valuable. Where, we ask, is the Association that can come to the aid of the low-country planters? The consideration of the subjects, as set in for above shows the valuable work that a low-country planter's association, if formed, is able to undertake. We have now a number of technical officers who are capable of giving very good advice. But the coconut planter has no organized body through which he can indicate his wants. This is a state of things that require early attention, and the low-country planters have to blame themselves if they do not utilize the advantages offered to them.—"Ceylon Standard."

INTRODUCTION TO ENTOMOLOGY.

(MISS ELEANOR A. ORMEROD.)

Insects begin their lives either by being hatched from eggs, or produced alive by the female; commonly they are hatched in the form known as maggots, caterpillars, or grubs, but they are never generated by the decaying vegetables, putrid water, bones, carcases, dung, or any other matter, dead or alive, excepting their own insect forerunners. They come out of these matters constantly, but, if the observer will watch, he may often see the arrival of the insects, the laying of the eggs, and be able to satisfy himself as to the gradual development and the method of breeding, and that the progeny is produced by the female insect.

The eggs are usually laid soon after the pairing of the male and female, and are deposited on or near whatever may be the food of the larvæ. They are laid singly or in patches, and are sometimes attached by a gummy secretion to the leaf or whatever they are laid on; occasionally they are fastened by a short thread, or raised (like the heads of pins) on a stiff foot-stalk of hardened viscid matter. Such insects as insert their eggs in living animal or vegetable matter are furnished with a special egg-laying apparatus or ovipositor, such as a borer, or organs enclosing bristle-like points on saws, by means of which the female pierces a hole, and passes the egg down into the wounded spot.

For the most part insect eggs hatch shortly after they are laid, but sometimes they remain unhatched during the water; and it is believed that, where circumstances are unfavourable to development, they may remain unhatched for years, but this point is one of those subjects on which more information is needed. They have been found to endure intense cold without injury, and, besides some special and extraordinary instances, it has been found by experiment that insect-eggs may be exposed to a temperature lower than that to which they are usually subjected in this country, and cold enough to solidify their contents without destroying their powers of hatching.

In a very few cases insects are partly developed before birth, otherwise, after hatching from the egg, or being produced alive (in the same first stage of development) by the female, insects pass their lives in three different conditions or stages successively.

The first is that in which they are known as maggots, grubs, or caterpillars; in the case of grasshoppers, cockroaches and some other insects, where the young are very much the same shape as the parent, only without wings, they usually go by the parent's name; the young of greenfly are sometimes known as "lice." In this state they are active, voracious, and increase in size; and in this first stage all insects are scientifically termed larvæ.

In the second stage some orders of insects are usually inactive and cannot feed, as is the case with the chrysalis of the butterfly, or the mummy-like form of the beetle or wasp with its limbs in distinct sheaths folded down beneath it; some, however, are active and feed, as grasshoppers, cockroaches, aphides (or green fly) and others, and resemble the parent insect, excepting that their wings and, for the most part, their wing cases are not as yet fully formed; and in this second stage all insects are scientifically termed pupœ.

The thirds tage is that of the perfect insect, in which (whether male or female, or of whatever different kind, as Moth Beetle, Cricket, Aphis, &c.,) it is scientifically termed an imago.

The term Larva is from the Latin, meaning a ask or ghost, and signifies that the insect in his stage gives a mere vague idea of its perfect form.

Pupa signifies an infant, and is fairly appropriate to the second stage in which the insect is forming into the perfect state, but is not fully developed either in its limbs or functions.

Imago signifies the image, the likeness, or an example of the perfect insect. The appropriateness of the scientific names for the first and third stage does not seem very clear, but there is no doubt of the convenience of having some one term by which each different stage of life of any insect may be described; and these are the words that have been adopted; in the following pages some detail is given of these three successive stages of development.

THE CULTIVATION AND CURING OF TOBACCO.

(Continued.)

8. *Harvesting.*

When the leaves feel thick and gummy, and begin to turn yellow with brown spots, they are considered to be mature and should be cut off. Tobacco should not be cut overripe. Harvesting of a plot should not be done at once; the mature plants are to be gathered first. The best time for harvesting is morning, as soon as the dew is off the plants. They should lie for some time in the sun, say for two hours, to make them sufficiently wilted, so that they can be handled without breaking. Care should be taken not to let them become too much sunburnt. It is better to cut whole plants (close to the roots) than gather the leaves singly. Harvesting should be delayed for two or three days if there be heavy rainfall, which washes away the gummy matter of the leaves.

9. *Drying and Fermenting.*

Immediately after the plants are conveyed to the house, they should be hung up on strings beneath the roofs of a well-ventilated house six inches apart. They should remain in this state for more than two months, or until they are quite dry. When very hot or strong winds blow, the windows and doors of the house should be closed. In very dry weather, the floor of the shed should be occasionally sprinkled with water, in order to keep the air of the room sufficiently moist. In June, when the rains commence again, the plants are taken down, stripped and handled Best medium and worst qualities should be separated at the time of stripping. 16 to 20 leaves are tied up into one bundle. These are put into large heaps 3 to 4 feet square by 5 to 6 feet high, and well pressed down with hands. The leaves are transferred from one place to another at intervals of about a week or so; fresh heaps being made, top leaves going into bottom, and bottom leaves coming to the top. This transference also involves examination of the leaves. Care should be taken to prevent excessive heating. At the end of the rains the leaves are considered to be fully cured and quite ready for sale. The heat may be broken up earlier, if so desired.

10. *Methods of Curing in vogue in Bengal.*

The modes of curing differ in the different districts; and it would be well to cite here the systems of curing in Rangpur, Jalpaiguri, Nadia and Tirhut, which are the principal seats of tobacco culture in Bengal.

Mode of Curingi n Rangpur and Jalpaiguri.—The methods of curing followed in Rangpur and Jalpaiguri are almost the same. The leaves of mature plants are cut off singly in the morning and are left in the sun for all day long. In the evening small bundles of four leaves are suspended along the roof of the house—generally a cowshed. After two months, *i.e.*, about the middle of June, they are taken down. Eight small bundles are then tied up into a larger bundle. Leaves are not sorted according to their quality, though the tobacco growers are aware that the topmost leaves are the best. The bundles of leaves are then put into a large heap. The bundles are taken out and dusted, and the heaps are made at intervals of eight or ten days, until the tobacco is wanted for sale. It is best to keep on the heap till about the close of the rainy season. Tobacco thus kept is said to bring higher prices.

Mode of Curing in Nadia.—"When cut, the stems with leaves on them are allowed to remain spread out in the sun for two hours. They are then cut into pieces, each of which contains a pair of leaves and a portion of the stem. These pieces are then arranged on the ground in layers of 9 to 10 inches thick, and are allowed to remain in the sun for two days. Rain, of course, at such a time is most destructive. Tobacco in this half-dried state is taken home by the cultivator, who strings the sections together, and suspends them on rows of strings in the longest apartment of his premises, usually the cowshed. The leaves after being thus suspended for about a month are thoroughly cured. They are then taken down on a damp or foggy day when they are a little soft, and made into bundles of about 11 maunds weight each, the strips of leaves being cut into lengths of about a yard, and folded over and laid one on another. The above description relates to the Hingli tobacco of Ranaghat; the inferior sorts appear to be merely made up into bundles and subjected to the alternate action of sun's rays by day, and of the dews at night."—*Vide* Collector of Nadia's Report, 1874.

Methods of Curing in Tirhoot.—"Plants are allowed to be on the ground as cut for a day or two; they are then carried to some grassy spot and laid out to catch the sun during the day, and the dew at night, being turned daily. After this has gone on for eight or ten days, every third or fourth day the plants are stacked together till they get heated, when they are again spread out to cool. If at this time the dew is thought not sufficient to cool the plant, at evening time a little water is scattered over the leaves as the lie; this goes on for twenty days or more. The plants are then brought into cover and stacked; they are changed every third or fourth day, the top going to be bottom, and so on. It is important now to prevent them getting over-heated: if the leaves show a tendency to get crisp, the leaves are covered with plantain leaves or damp grass, over which is put a blanket to make the heap sweat. The leaves are then separated by khurpi or huswa from the stem. They are then tied five or six together with strips of date leaves and piled together. These piles are again watched carefully till it is evident that the leaves will not heat any more. They are then tied up in bundles of four maunds each, wrapped round with straw, and are then fit for the market; if not immediately sold, they are stowed away in some dry place. If the leaves are not of a good colour, the cultivator may, before opening them for sale, get a little good tobacco, boil it, and sprinkle the juice over them after the last process of drying; but this is more a trick of trade than a method of curing, which being really nothing more than a careful alternative of heat and moisture, no extraneous matter being introduced."—Collector of Tirhoot's Report.

11. Seeding.

The best plants are set aside for seeding. They are not topped like others, but the side shoots and suckers are removed from the stems, only the heads or tops of the plants being preserved for seed. The heads are tied to sticks to keep them straight.

As soon as the seed is ripe, the heads of plants are cut off and hung in a dry and safe place. After a few days the seed are rubbed out of the pods by hand and stored. The seed should be preserved from damp and insects.

The vitality of the seed can be tested by scattering some on a piece of hot iron. If a sharp spattering sound is given out, the seed may be considered to be sound.

12. Outturn.

A well-grown crop is expected to yield from 20 to 24 maunds per acre, the money value of which may be estimated at Rs. 100 to 120, Rs. 5 being the average price per maund of country cured tobacco.

13. Injuries.

The chief enemy of the tobacco crop is a kind of caterpillar which eats away the leaves at night and takes shelter in the soil by day. This caterpillar or cutworm causes serious damage to the young plants. They should be carefully looked for and killed when any injury from this source is noticed. Hailstorms often destroy the crop over large areas of the country.

14. Suggestions for Improvements and Conclusion.—Tobacco is one of the most profitable crops grown in tropical and sub-tropical countries. India is one of the important tobacco-growing countries of the world; but as regards the quality, Indian tobacco is very inferior. The only chemical deficiency of the Indian tobacco, according to the results of several analyses, is in carbonate of potash, proving the poverty of Indian soils in this important plant food. It may, however, be supplied by manuring the crop with saltpetre, which is easily obtainable at a moderate cost. Another direction in which improvement is possible is the cultivation of acclimatised foreign varieties, such as Havana, Dindigul, Samatra, Landreth's, etc., which grow as well as any of the indigenous varieties, and are certainly better adapted for cigar making than the latter, which are extremely coarse for the purpose. Seeds of these varieties can be had from the Agricultural Department, Bengal. Defective curing is, however, held to be the chief cause of the general inferiority of Indian tobacco. The curing of tobacco is a difficult art which requires to be learnt by experience. The simple directions for curing given in paragraph 9 will, it is believed, lead to some improvement in the quality of the tobacco. They have been followed with useful results by Mr. B. Pal Chaudhry on his Home Farm at Natuda in the Nadia district.—*Indian Agriculturist.*

RICE AS A FOOD STAPLE.

Rice is becoming more and more an important article of alimentation, as is evidenced by its increased importation. It remains a favourite dish among sweets, is largely consumed in soups, and in madeup dishes, while being extensively utillized along with wheaten flour to secure greater whiteness of the bread. It is also largely used to make starch. The rice emanating from South Carolina and from British Burmah are the two varieties most in request. Japanese rice of late meets with a fair demand. Indeed, when it is borne in mind that rice feeds one-third of the human race, and that it is considerably cultivated in Asia—no less than 100 different varieties alone are peculiar to British India and Ceylon, and Northern and Central America—the importance of the plant of its product will be much better appreciated. Its growth has been attempted in Northern France, and the experiment was tried with partial success of raising it south of the Thames, outside London. Rice exacts a warm climate, but above all, a humid soil; hence, why the growing crop has to be irrigated with so much care. Before being harvested, etc., the soil is freed from water, the crop duly cut with the sickle, and it is next threshed by means of the flail or by machinery; in some cases the grain is simply trampled out by cattle. The rice which has been obtained in the latter way, in the husk, is called "paddy;" the grain adheres firmly to the husk, so much so, that specially machinery has to be employed in order not to injure or break the grain.

The superiority of Carolina rice is due principally to the extreme care taken by the American growers to turn out clean samples. After it is husked, the grain passes through a whitening machine, which removes the inner cuticle or red skin. This done, the rice is fit for sale. Like the potato, rice is largely employed to prepare starch; it is treated with a solution of caustic soda, which dissolves out the nitrogenous matters; the starch deposits, and is weighed and dried. The analysis of Chemist Payen, and that which is generally accepted, gives the composition of rice as follows: Nitrogenous matter, 7·55; starch, 88·65; dextrine, etc., 100; fatty matters, 0·80; cellulose, 1·10; and mineral matters, 0·90. Rice then resembles nearly the composition of the potato, which contains, as will be remembered, so much starch and so little nitrogen, fat and mineral substances. It explains also why rice is not a complete food, and why it is necessary to supplement it with meat, vegetables or fish. But rice possesses the great advantage of being easily digested, and does not fatigue or inconvenience the stomach. Hence, its efficacy as a remedial agent in cases of diseases of that organ, and of the intestinal channels. It exercises no laxative action as other cereals are reported to do, and which explains the efficacy of rice in cases of dysentery and diarrhœa. China is able to procure two crops of rice every year; the Chinese sow it in March and July; the inhabitants of the Flowery Land pride themselves on completely understanding its cultivation, the whole secret of which is to give the plant a great deal of water. It may not be generally known that the Americans were indebted for his grain to a Mr. D.bois, who was treasurer of the East India Company, and who gave a small bag of the said grain to a

merchant of Carolina. This is how Europeans came to be chiefly supplied from Africa with Carolina rice, and which is everywhere accepted as being much the finest of its kind, the grains being double the size of that which comes from the East Indies, and known as Patna rice. Rice is said to be best cooked by thorough steaming; while in case of sickness, rice water can be prepared, sweetened and flavoured in the same way as is barley water.

The rice when being turned out for market is sifted and classified into five categories; one, known as broken rice, which is not to be disdained; if well cleaned, it will form an excellent mucilage, or when ground into flour, it can be mixed along with some wheaten meal, and thus cheapen, as well as whiten loaves of bread. Japanese rice is said to be rich in nitrogenous substance, no matter whether it be the upland, mountains, or lowland varieties. In some districts of India rice is not allowed to be consumed until after a lapse of six months from the time it is gathered, many even prescribe a longer period. A good hour is allowed for the digestion of rice. If the rice be anyway old, it is of course more difficult to digest. A very strong spirit is obtained from rice called arrack, which is partly made from it, being also mixed with toddy, which is the juice of the coconut tree. Sake is another national beverage prepared in Japan from fermented rice. In many countries rice is mixed with bean or pea meal; that combination is recommended to the parched rice travellers that have to secure that kind when on long voyages in unknown lands. South Carolina claims to have obtained the first seed rice from the Island of Madagascar, between 1700 and 1720. The importation of rice into the United Kingdom is nearly 80,000,000 of cwts. annually, and estimated at 3,500,000 of pounds sterling. Strange, though nevertheless a fact, that rice was not known to the ancients, and there is no mention of it in the Bible.—*London Correspondent in Grocers' Criterion.*

PEPPER CULTIVATION IN MALABAR.

Pepper (*Piper nigrum*) is grown in Java, Sumatra, Ceylon, and other Asiatic countries, but that which comes from the Malabar Coast is acknowledged to be the best. The only taluqs in Malabar in which pepper cultivation is largely carried on are Kottayam and Kurumbranad. The conditions most favourable to pepper cultivation are said to be copious rains, abundant dew in the night, and a gravelly red soil. These are found in other parts of Malabar, so it is not understood why the cultivation is chiefly confined to these two taluqs. Two varieties of pepper are produced in Malabar—the black and the white. The fruit is gathered green when intended for black pepper, but must become quite ripe for white pepper. White pepper differs from the black only in being stripped of its covering. After stripping them, the black berries are steeped in salt water, and when they have been exposed to the sun for several days the chaff is rubbed off with the hands. The process of cultivation is very simple. The vine is generally propagated by cuttings. It is usually planted at the base of trees, the most commonly used being *Murikku* (Erythrina Indica); other trees, such as the jack, cashewnut, and mango-tree, may also be used, but they are not in favour with the Malabar cultivators.

The first thing required for forming a pepper garden is to clear all jungle and root out all stumps of trees on the ground. This must be done by the middle of May. The *Murikku* standards, on which the vine is trained, should then be planted, and about half a dozen cuttings of the vine—each about 2½ feet in length—should be planted at the foot of each stem. The soil should then be turned, up by digging, and the cuttings tied with a fibre on to the *Murikku* crop. The tying is necessary to faciliate the growth of the vine, which sends out small roots at every joint, which strike into the *Murikku* stem and enable the vine to climb up the prop. In three or four years the vine attains a height of six feet.

The vines begin to bear in the third or fourth year, and in four years more are in full perfection, and continues so for 20 years, when they die. They blossom about the month of June, and begin to bear fruit in the following two months. The gathering season is January to March. The plant requires constant rains during the blossoming season. The expenses of cultivation incidental to farming and maintaining pepper plantations are variously stated. But it may be stated approximately that a plantation of one acre will not cost more than Rs. 300, together with an annual expenditure of Rs. 10 for its upkeep. The outturns of the pepper harvest are also variously stated. The yield ranges from one to three bharams per acre (one bharam being equivalent to 660 lbs). It is stated that a single vine produces from one edangali to four edangalis of dried pepper. There is no doubt that pepper cultivation is highly remunerative, and it is apity that it is not carried on more extensively than it is at present.

USES OF SALT.

Most farmers are aware that salt possesses valuable manurial qualities in connection with some soils, but its application has not been nearly so extensive as is desirable. Salt consists of two-thirds chloride and one-third soda, and as the solvent powers of chloride are enormously greater than those of rain water, its ability to break up soil and leave its constituents free and available for nourishing the roots of plants is a highly valuable qualification. Salt absorbs moisture from the atmosphere and helps to retain it in the soil, thus compensating, to some extent, for a deficiency of rain, and it also purifies and decomposes inert matter. When used in connection with stubborn soils they are made easier to work, while, at the same time, it is of material assistance in helping to destroy wireworms, slugs, and other insect pests. Salt is especially valuable for sour pasture lands. its action being to make the grasses sweet and palatable for stock. It also neutralises the injurious effects of rank grasses on new

pastures. For strengthening the straw of cererals the use of salt is most important, owing to the fact that it seems to be the only substance which has the chemical power of setting free the requisite quantity of silica to nourish the stems. Salt, when previously incorporated with the soil, is useful for root crops on account of its powerful moistening qualities and its action in preventing disease. A plentiful application of salt to the manure-heap will not only fix the valuable ammonia, but will destroy millions of vermin, which otherwise would be carried on to the land to the damage of the crops. It is difficult to lay down a hard and fast rule for the application of salt, as so much depends upon the constitution and condition of the soil and on the season. Under ordinary circumstances, from 6 cwt. to 8 cwt. per acre for cereals and about 10 cwt. for roots is generally recommended upon the breaking up of land, or the month before seed time. Salt should not be applied with the seed. Repeated topdressings in small quantities during the spring will be found beneficial, and it may be liberally applied to fallows and on the stubble. The antiseptic properties of salt render it highly valuable for sweetening and preserving fodder and prevent hay from becoming mouldy.—*Australasian.*

POULTRY NOTES.

If eggs are required the best breeds are Black Minorca and white Leghorn. If eggs and flesh, the Orpington stands first. If flesh only the red Indian game is the best. The cross with the Dorking is considered the best table bird in the English market. Enquiry in England, Jersey &c. has brought out the general opinion that the Orpington is the best all-round fowl for a poultry farm. The bird is large, of a good flavour, lays very good eggs, and its constitution is good. But as a rule too heavy birds should be avoided, especially those heavily-feathered in the legs.

There are many forms of the incubator, but among the most reliable are Hearson's "self-regulating," Tamplin's "Gans Parpil" or Harris' American incubator. The eggs in the incubator should be kept moist. This is the great feature of Hearsons, and is covered by patent. The cost for 100 eggs is about £12. Their address is "Chas. Hearson & Co., 235, Regent Street, London S.W. A very useful and practical book is supplied.

Fowls lay more the first year than any other, and in the second nearly as many,—in fact most of the eggs a pullet will lay are laid in the first two years. Fowls should not be kept over two years, as they do not then pay. This entails marking. The simplest way is by rings of aluminium—the first year on one leg, and the second on the other; then sell. For breeding purposes, one cock is required for ten hens.

The outside peel of onions is about as useless substance as one can think of, but when some of it is put into a hen's nest (only the driest parts being used) it makes the nests disagreeable, and thus frees them from fowl lice.

To get rid of scales on hens' legs, mix equal quantities of ground yellow sulphur and good lard well together and apply every day to the legs as an ointment for a week or ten days. Equal quantities of salad oil and kerosine mixed have a good effect in removing the rough scales.

An excellent disinfectant for fowl houses, to be used when the birds are out, is a solution of bluestone (copperas or sulphate of copper), sprinkled by means of a watering can. It removes bad odours at once, and is fatal to disease germs.

A skilled eye can tell the difference between fertile and unfertile eggs in three or four days after setting, but it will be better for you to wait until the eighth night. Go to the sitting-house when it is quite dark, and take with you a candle or lantern, preferably of the bull's-eye type, and a fresh-laid egg. Take the latter between the forefinger and thumb, so that it is surrounded by a dark frame, and hold it up to the light. It will be clear and transparent, nothing dark showing behind the shell. Now take the eggs, whether fowls or ducks, one by one from under the hen, and examine them in a similar way; the unfertile will look like the fresh egg, the fertile will show dark patches behind the shell. The difference should be at once apparent; but if you are doubtful about any, it is safer to mark them and replace, and test again a day or two later. The unfertile should be removed and hard boiled for the future chicks.

GENERAL ITEMS.

The artichoke belongs to the Thistle family (Compositæ). It is botanically known as *Ceynara scolymus*. The bottoms of the flowers and the riblike sepals are used as food by man. The so-called Jerusalem artichoke, though belonging to the same family, is a member of a totally distinct branch. It is named scientifically *Helianthus tuberoses.* The name Jerusalem is a corruption of the word Girasole, which is the term applied by the Italians to this plant as well as to the sunflower (*Helianthus annus*). The Jerusalem artichoke is said to possess exceptional drought-resisting properties, which make it an excellent standby for both man and beast during protracted droughts, since it is in many respects a valuable esculent for man, as well as a first-class feed for cattle, horses, sheep and pigs. The green tops or stalks are made use of as green fodder, hay or ensilage; but the main value of the plant lies in its tubers growing like potatoes in large numbers round the roots. These tubers (called in French *Topinambours*) form a very palatable food when fried in butter or boiled, or still better steamed, but best of all baked under hot ashes. For animals their feeding, milk-producing and fattening value is considerable.

The *Cape Agricultural Journal* makes reference to two useful parasites on insects injurious to vegetation: one is the South African parasite destructive to the black or olive scale, a shipment of which has been made to America. The parasites

will be placed on a couple of dozen small-olive trees, planted in pots, and covered with fine muslin so as to prevent their escape, and they will be released. After watching their action on the black scale on these pot plants they will be transfered to the orchard if they do well and permitted to scatter among the trees and propagate,

The other parasite (*Masicira pachytyli*) has just been brought over to California together with dead grasshoppers in the refrigerating room of the steamer to prevent the development of the parasites on the voyage. On arrival they were placed in a glass breeding jar, and after being allowed to issue, they were liberated in localities where the grasshoppers are now breeding. The parasite belongs to the genus Tachina, nearly all the members of which are parasitic or insects injurious to orchards, vineyard and farm products, and it is said that they cannot even be starved to eating any vegetable growth. The parasite resembles a house fly. The eggs of the female are deposited on the grasshopper, and their hatching produce maggots which burrow into the fly. It has been found that from 60 to 90 per cent of the grasshoppers have been known to have been destroyed in districts where the parasite has been introduced.

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According to the *British Medical Review*, Dr. Jenni has found that it is possible to free a town from mosquitoes (unless the conditions are exceptionally unfavourable), and that the cost of bringing about such a consummation in a town of 50,000 inhabitants will be from R1,500 to R2,000 a year. The procedure consisted mainly of finding the breeding places of the mosquitoes and destroying the larvae by means of petroleum.

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The *New York Merchants' Review* has the following amusing reference to the nutmeg tree:—A peculiarity of the nut-pigeons inhabiting the Indian Archipelago is that they swallow the nutmeg fruit bodily and discharge the nut undigested. This curiosity which leads to the distribution of the plant was formerly connected with the sex as shown in Vogel's remarkable passage: "If the bird that drops the nut is a male, the tree growing from it will be a male too; if the bird is a female, the tree will be a female as well, whilst if the bird happens to be still a virgin, the tree that grows from the swallowed nut will be one of the best in the wood."

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The following are as nearly as possible the correct quantities to sow per acre:—Barley, broadcast 1 to 1½ bushels; drilled ½ bushel. Beans (broad) drilled 1¼ bushel; (French) 1½ bushel; (Horse) 2 bushels. Beet (drilled) 5 lbs., Buckwheat, broadcast, 1 to 2 bushels. Cabbage (field), in seed beds, 2 lb. Carrots, drilled, 5 to 7 lb. Clover, broadcast, 12 to 20 lbs. Grasses, prairie, 1 bushel: Italian rye, 4 bushels; perennial rye, 2 bushels; rib,; ½ bushel; couch, ½ bushel; permanent mixed pasture, 3 bushels; imphee, 20 lb.; kohl-rabi, drilled, 2⅙ lb. Lucerne, broadcast, 20 lb.; drilled 10 lb.; Maize, broadcast, 3 bushels; drilled, ⅓ bushel. Mangolds, drilled, 5 to 6 lb. Millet, broadcast, 1 bushel. Oats, broadcast, 2 bushels. Onions, broadcast, 5 lb.; drilled for setts, 20 lb. Panicum, broadcast, 20 lb. Parsnips, drilled, 8 to 10 lb. Peas, broadcast, 3½ bushels; drilled, 2 bushels. Potatoes 14 cwt. of cut setts; if planted with the American potato planter 10 cwt. Rye for grain, broadcast, ¾ bushel. If for saddlers' use, 1½ bushels. Sorghum for grain in drills 10 lb., broadcaat for green fodder 20 lb. Swedes, 3 lb. to 4 lb. Turnips, globe and yellow, drilled 2 lb. Vetches, broadcast. 3 bushels. Wheat, broadcast, 1 to 1½ bushels; drilled, ¼ bushel. Paddy (rice), 30 to 40 lb. Cow pea, 8 lb. Jerusalem artichoke, 3 to 4 cwt. The weights per bushel of the principal farm seeds enumerated above are:—Barley, 50 lb.; beans, 60 lb.; buckwheat, 50 lb.; couch grass, 40 lb.; cocksfoot, 20 lb.; clover, 60 lb.; flax, 60 lb.; grasses (mixed), 20 lb.; oats, 40 lb.; imphee, 40 lb.; prairie grass, 20 lb.; perennial rye grass, 20 lb.; peas, 60 lb.: rye, 60 lb.; rib grass, 60 lb.; sorghum, 40 lbs.; lucerne, 60 lb.; panicum, 60 lb.; maize, 56 lbs.; wheat, 60 lb.

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When the bark of rubber-producing trees is soaked in dilute sulphuric acid, it is found that the acid decomposes the tissues without affecting the rubber which is thus got quite pure. This process is maintained by *Engineer* as having been described before the Society of Civil Engineers of France. To French chemists is also attributed the discovery of extracting rubber from the Candolphia vine by crushing the vine in hot-water. The ordinary method of stepping is impracticable owing to the latter hardening quickly.

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Mr. C. Staiger, late Government Analyst of Queensland, found the seeds of kekuna (*Aleurites triloba*) to consist of the following:—1. The dry nuts; shell, 70 per cent; kernel, 30 per cent. 2, kernel, free from shell; oil 54·3 per cent; amylaceous and nitrogenous substances, 45·7 per cent.